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APRIL 1960

Volume 55 Number 4

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IN THIS ISSUE

SPECIAL DISTEMPER VACCINE REPORT
BOVINE LISTERIOSIS—FIELD REPORT
NEW DEVELOPMENT IN RABIES VACCINE TESTING
THREE NEW TECHNICS IN DERMATITIS THERAPY
BABY PIG DISEASES—PART 4

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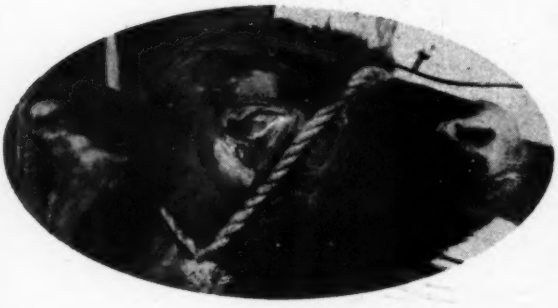

DECTON Blue . . . contains dequalinium chloride (an entirely new antibacterial compound) and methylene blue in a finely-divided, free-flowing urea base. It is recommended for infectious keratitis and in all types of wounds in large animals.

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In a study with 85 subfertile dairy cows, 61.7% of 34 treated with an intra-uterine injection of FURACIN Solution Veterinary conceived at first service, while only 19.3% of 31 treated in an identical manner with 10% saline solution conceived at first service; 40% of 20 non-treated controls conceived at first service.[2]

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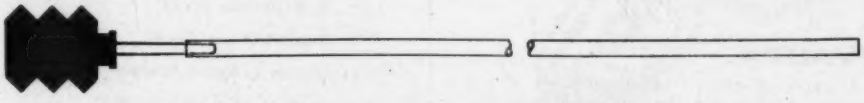
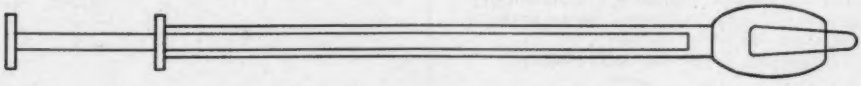


STEP 2. During the following 3 weeks, insert 1 FURACIN Suppository Veterinary into the anterior portion of the vagina 3 times each week on alternate days.



The cow may then be bred during the next estrus.

Supply: FURACIN Solution Veterinary SQUEEJET (30 cc. each), boxes of 12; FURACIN Suppositories Veterinary, boxes of 12.

1.Vigue, R. F., et al.: J. Am. Vet. M. Ass. 134:308 (April 1) 1959.
2.Vigue, R. F.: Personal communication.

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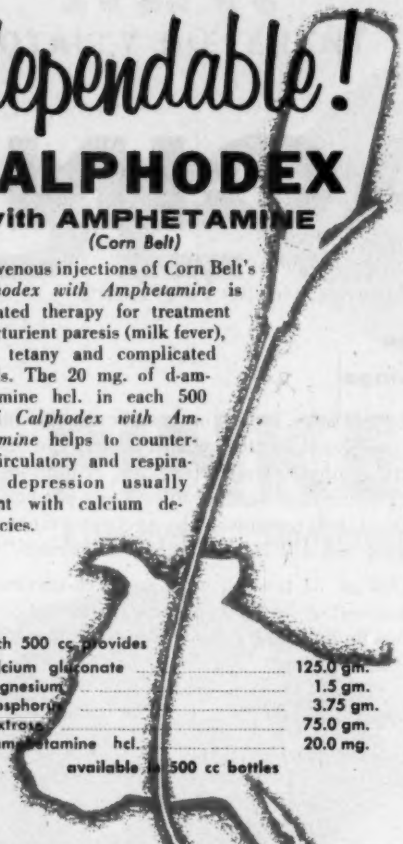

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VETERINARY MEDICINE

April 1960

Volume 55 Number 4

NOW DISTOVAX* H

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NEWS COMMENT

Pregnancy Testing

Pregnancy testing has paid off well in the Colorado State University herd at the San Juan Branch Experiment Station. A four year culling program increased the calf crop from a normal figure of 76% to 85%. This constitutes a 9% increase in calf crop or an increase of gross income of about $11.00 more for each cow wintered. This makes a veterinarian's fee for pregnancy examination a mighty good investment and a popular professional service.

Small Cars Insured at 10% Less

More than 400 companies plan rate reductions of 10 per cent for insurance on smaller automobiles, including U.S. manufactured "compact" cars. This reduction took place March 1 in most states and is planned later in the rest. Companies expect lower damage losses from the small cars and a few companies already had made rate reductions for smaller cars in several states.

Artificial Insemination of Boars

Using artificial insemination, investigators estimate a good boar could sire some 8,000 pigs annually. By comparison, one boar under average conditions sires about 320 pigs. Interest in artificial breeding is high. If it comes into common use, swine testing stations would become more important. A large percentage of boars used could be progeny tested. Other suggested advantages that good boars would be more readily available to smaller herds and semen from a really good boar could be used for several years, even after death.

Milk Production Declines

U.S. milk production showed almost a billion pound decline for the 11 month period from January-November, 1959. Market specialists point out that this reflects high prices of beef cattle compared to price of milk and butterfat. In recent months this relationship has begun to change and it seems reasonable to expect an increase in milk output shortly.

TB Vaccine May Combat Tumors in Mice

A vaccine used to stimulate the body's defences against tuberculosis appears to increase the resistance of mice to tumors. Sloan-Kettering research workers working with implantation of sarcoma 180 have observed this phenomenon following use of BCG, the live TB vaccine.

Medical Student Financial Aid

A move is under way in Congress to provide the nation's medical schools with help in recruiting top-quality students. Rep. John E. Fogary (D-R.I.) has called for establishment of Federal scholarships for deserving students in the fields of medicine, osteopathy and dentistry. Students picked on a basis of ability and need for assistance, could get up to $2,500 a year.

This move is intended to give medical and dental students at least the same break as science students got under the Defense Education Act. Veterinary Medicine is not mentioned for assistance.

Socialized Medicine

It looks like state medicine, in limited form, enjoyed now by veterans, is going to be extended to retired persons over 65. The administration favors some program of this type. Cost will probably be one-half per cent of payrolls to start but eventually could raise payroll tax to 10 per cent. Now runs 6 per cent.

Milk Content Measurement

If and when the industry is ready to move to a policy of buying milk on a solids-not-fat content rather than on the butterfat content basis, scientists are ready. Workers at the Michigan Agricultural Experiment Station have developed a method for determining the (SNF) content of milk from a drop of milk. The method is based on how fast a drop of milk passes through a liquid medium. Two electric eyes measure the speed of the drop.

Magnetic Medication

Chemical particles known as alpha iron crystals will pass through the tiniest capillaries of the body carrying isotopic radiation or therapeutic drugs, thus directing medication to a particular part of the body by magnetism. Research to this effect has been carried out by Dr. Michael W. Freeman of Detroit and Anthony Arrott of Dearborn.

X-ray Images

Scientists of Hamburg, Germany have devised a magnetic surfaced drum which, when spinning under a recording head at 3,000 times a minute, can record and televise x-ray images before the film has been developed. This enables scientists to produce roentgenograms through a television picture tube immediately after a recording is made.

V

Here each month are published ideas, suggestions and comments picked up by VM reporters at veterinary meetings.

The Meeting Circuit

Urinary Calculi

A Hereford feeder steer with "waterbelly" prompted the operator of a feedlot at El Centro, California to call Dr. Vurl E. Fisher and myself for consultation, but the animal was dead on arrival. The animal was close to two years of age, and weighed 800 to 900 lb. In the few days preceding death the foreman had noticed that the animal was slow of movement. It had lain down with its head in the mud. Appetite was apparently normal. The day veterinary assistance was called, a large swelling was noticed under the abdomen in the area surrounding the sheath. It is likely that it had been there for some time, growing larger. In a feedlot operation running between 3,000 to 4,000 cattle, such a condition could have been overlooked.

On post mortem examination an incision was made in the abdomen, along the sheath. The abdominal wall was very edematous and about 1½ in. thick. The waterbelly itself was 5 to 6 in. thick, with the areolar tissue grossly distended, gelatinous and infiltrated with urine.

The area was streaked with colored tissue of many shades, red, brown, purple. In particular, there were pink deposits, like the color of Sulmet, although the foreman said the animal was given no medication. The urethra was incised posteriorly from the glans penis. Sandy deposits were embedded in the urethral wall throughout its length. A calculus about ¼ in. in diameter was found in this area, and more calculi popped out as we continued to cut posteriorly. The sigmoid flexure appeared to be erased.

In the peritoneal cavity, a huge organ was observed which was about 12 by 15 in. and covered with yellow fat. It was about the size of the omasum. On incision it turned out to be the left kidney. All stages of renal pathology were present. Lobules were pale and spread apart by degenerative and suppurative processes. The kidney proper measured about 12 by 8 in.

The bladder was incised. Its wall was hypertrophied and about ¼ in. thick. At the fundus the urine was fairly normal, but toward the apex it became more and more mucopurulent. Calculi were found there, ⅛ by ¼ in. in diameter, some of which are pictured here. The right kidney and the other viscera were normal.—*Haskell Konigsberg, D.V.M.*

White Muscle Disease

White muscle disease has long been considered the result of an uncomplicated vitamin E deficiency. Characteristic lesions are similar to those produced experimentally in avitaminosis E studies. Nevertheless,

studies have failed to show any significant correlation among the vitamin E blood levels of affected animals and of the feed and the severity of the disease.

In some experiments in Oregon, feeding of a protein or grain supplement during the last part of the gestation period appeared to protect calves and lambs against white muscle disease. Vitamin E had no effect in that particular trial. In another experiment, injection of lambs with sodium selenite offered protection.

It appears that white muscle disease may be a multiple deficiency disease and metabolic interrelationships exist among vitamin E, selenium, and possibly protein or specific amino acids. Possibly a toxic material is involved, whose deleterious effect is overcome by vitamin E or selenium.

It must be kept in mind that selenium compounds are toxic. Chronic poisoning may result if 5 p.p.m. is continuously ingested. Solutions for injection must be made up accurately and handled and measured carefully. No specific biochemical diagnostic method for subclinical white muscle disease is available. However, the serum level of the enzyme glutamic-oxaloacete transaminase has been used and offers promise as a diagnostic aid. Present in high concentration in muscle and other tissues, in myopathies the enzyme spills into the blood and reaches quite high levels. For this determination fresh serum is required with the clot poured off. If in transit for any length of time, the serum should be frozen and shipped in dry ice.—*J. W. Needham, Ph.D., Florida State Meeting, 1959.*

Control of Anaplasmosis

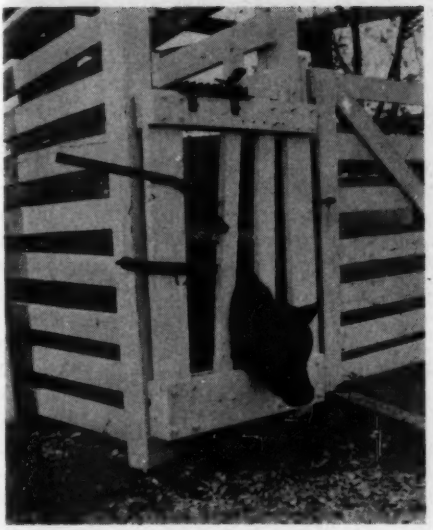
During 1958, extensive losses of cattle due to anaplasmosis occurred in many areas of Mississippi, including Warren County. This prompted efforts to be made through use of the complement-fixation test, tetracycline drugs, and augmented insect control, to reduce losses in 1959. Blood testing was accomplished in the winter and early spring of 1959. This report covers the following summer and fall up to January 1960.

This is a summary of experiences with eleven herds comprising 2,787 cattle on which the complement-fixation test was initially run. Most cattle found negative on initial test were retested 30 to 60 days later. A third test was run on some of the negative herds eight to ten months later. Of the 2,787 cattle, 38% were reactors on the initial test. All complement-fixation tests were accomplished at Beltsville, Maryland by the A.R.S. laboratory personnel under the direction of Dr. W. H. Martin.

Each herd had problems peculiar to its own size, location, herd management methods, and incidence of infection. All herd owners who followed the program of separating reactors from negative cattle believed the program to be successful. Cases of anaplasmosis were reported in only one negative herd in the season following testing and separation. This herd (AD) has sustained losses of some 43 head during 1958 out of a total of about 180 head. A large number of affected cattle recovered. The entire herd of adult cattle was treated at height of 1958 outbreak with oxytetracycline hydrochloride (Liquimycin—Pfizer) administered parenterally. Some individuals were given two or three consecutive days of treatment consisting of one daily dose of 2 to 3 mg. per pound body weight, but all animals were given at least one dose of 1 to 2 mg. per pound. During 1959 the negative herd of about 60 head became infected with six recognized cases and two deaths.

Only one herd (HO) contained no reactors on any of three tests, the first of which was made in April 1959 and the last in December 1959.

Another herd (MY) had nearly 70% reactors and was not retested. No program of segregation or separation of reactors and negative cattle was carried out in this herd of 372 bled cattle. Calves under two months of age were not bled in any herds. There had been about 15 deaths attributed to anaplasmosis in 1958, with an undetermined number of recoveries. In this herd of 70% reactors and 30% negatives, there were only eight death losses due to anaplasmosis the following year. Most negative animals (about 120 head) were quite young. Immature cattle usually recover if they become infected, and may not show recogniza-



Do It Yourself Chute Kit

For the client that claims he can't afford a good chute you can suggest that he look into the possibility of getting one of the new kits which will provide a workable chute for about $30.00 and several hours of work.

Designed by Maxwell F. May, Baring, Missouri, the kit costs $17.95 F.O.B., Baring, Missouri. This 19 lb. package will be shipped, Parcel Post, and contains complete chute gate hardware, a drawing showing a suggested gate design, a bill of material showing what is furnished and what must be purchased locally.

A cattle owner with an engineering background, Mr. May designed this kit when he found he could not purchase ready to use hardware locally.

---

ble symptoms of illness when infected.

One herd had experienced no losses prior to testing, although one case of anaplasmosis had been recognized. Yet 16, or 50%, of the 32 cattle in this herd were reactors.

The largest herd (930 animals) bled revealed a little under 50% reactors. No losses were experienced subsequent to testing and segregation of negatives and reactors. During the previous season, 18 deaths were attributed to anaplasmosis, whereas numerous other cases recovered.

Some of the animals reacting to the test were considered valuable enough to warrant treatment in order to destroy the carrier state. Two heifers that were positive (reacted) to the complement-fixation test on February 27, 1959 were weighed and treated once daily with 5 mg. per lb. body weight of oxytetracycline hydrochloride for 12 consecutive days. Although this particular formulation is not recommended for parenteral use, it was administered intramuscularly, subcutaneously, and intraperitoneally without apparent ill effects other than some transient local swelling. Sixty-one days after completion of treatment, the heifers were still positive to complement-fixation test, but 114 days after treatment both were negative.

In another herd, 14 cows reacting to test of May 9, 1959 were treated similarly with the same product for 12 days. Thirty-seven days after completion of treatment they were bled; eight were negative; five were suspects; and one remained a reactor to complement-fixation test.

Of some 40 reactors retested at intervals of up to eight months (not given any treatment) only two changed their status to negative.

It appears that the complement-fixation test for detection of anaplasmosis carriers coupled with the judicious use of oxytetracycline hydrochloride may be valuable tools in the control of anaplasmosis.—*W. H. Lindley, D.V.M., Vicksburg, Mississippi.*

Antibiotics in Ruminants

Antibiotics are now becoming popular in ruminant feeding. Tests have been designed to study the effect on efficiency of feed utilization, rate of growth, changes in carcass quality, and influence on the susceptibility to and recovery from such diseases as

shipping fever complex, the rumenitis-liver abscess complex, foot rot, enterotoxemia, intestinal disturbances, and mastitis.

Most of the research workers are agreed on a few general statements, when antibiotics are fed according to the recommendations of the manufacturers.

1. Calf scours and digestive disturbances in dairy calves are reduced in severity and incidence.

2. The rate of growth of calves in the pre-rumen stage is affected at a non-significant level in most cases.

3. The efficiency of feed conversion of feedlot cattle usually will be improved, and will be in the range of 3 to 4% or upward.

4. The rate of growth of feedlot cattle will be increased fairly consistently and in the range of 3 to 4%.

5. The carcass quality will not be upgraded, even though the animals are in better general condition and show more bloom.

6. The shipping fever complex is sometimes alleviated, but is not dependably controlled.

7. The rumenitis-liver abscess syndrome is sometimes, but not always, alleviated.

8. The foot rot problem is believed by the feeders to be improved, but data to substantiate this are erratic.

9. The place of antibiotics in the rations of lactating sows and fattening lambs remains questionable.—*R. C. Klussendorf, D.V.M., Montana Nutrition Conference, Montana State College, Bozeman, Montana, February 8-9, 1960.*

Nutritional Requirements

All farm managers feed their mares nothing but the best of feed (green leafy hay, heaviest, brightest oats, yellow — always yellow — corn, limestone water), all with no regard for expense. But, nevertheless, is there ever a place for supplements, especially vitamin or mineral supplements? If so, please cite a few, stating their application and specific value for mares, considering the three classes: maiden, barren, foaling.

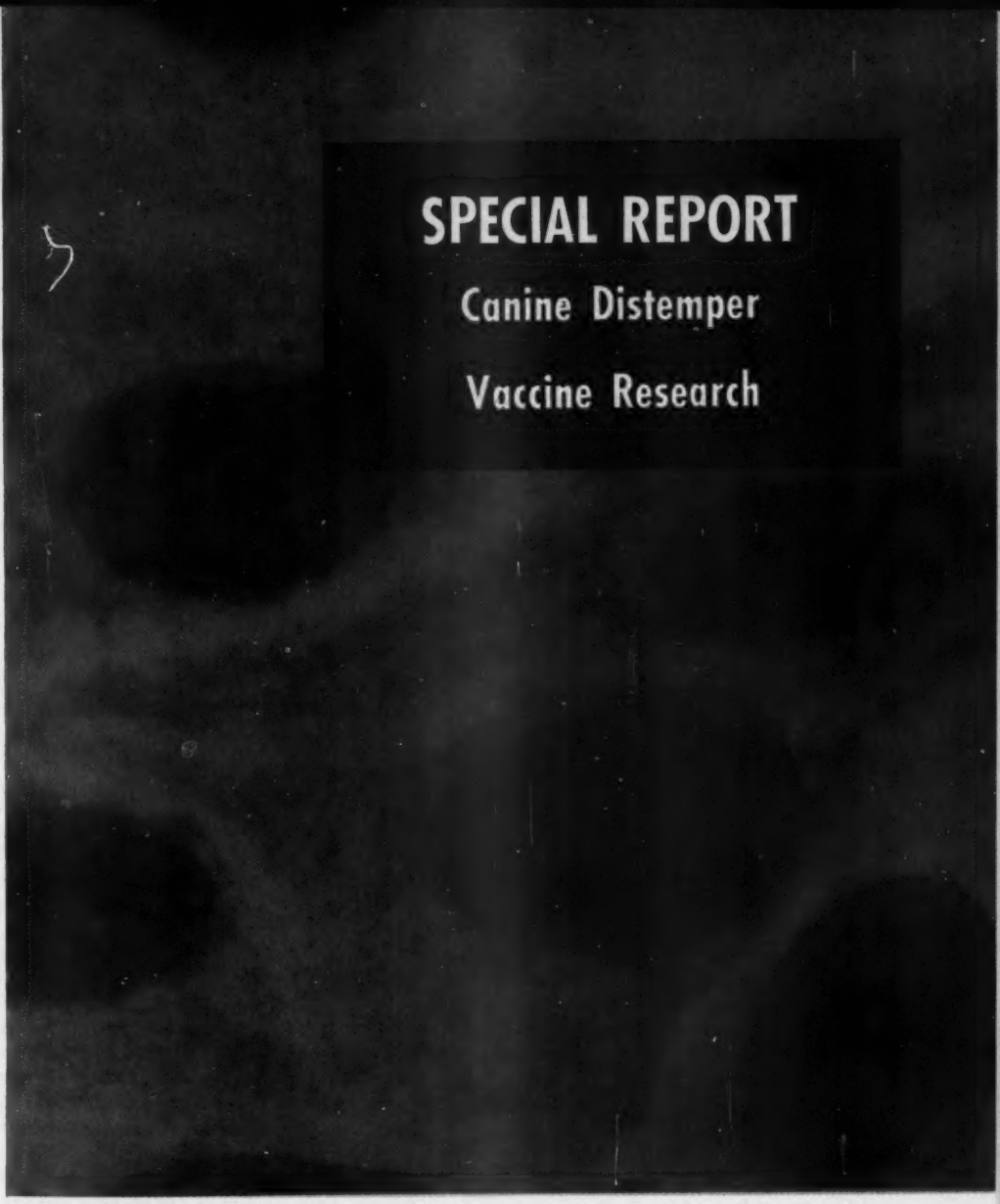
I think there are specific indications in some cases. As Mr. Endicott says, it's a matter of observation. A maiden mare that has been raced hard does need a little help in getting into any kind of a decent breeding condition. Perhaps they can do it themselves, but perhaps they will do it quicker if they have a little assistance. If a blood examination is made and it shows an indication of anemia, a good vitamin could be used as indicated. Barren mares do need examinations. If there is something wrong with a mare, you must, of course, find out what is the matter. Foaling mares especially may need a little more of the vitamin and mineral supplements than usual. If you have an early foaling mare and she's been brought down a little bit, certainly you should go ahead and put her on a good mixture. As for feeding mares a lot of vitamin and mineral supplements indiscriminately, I don't recommend it.—*Dr. W. R. McGee*

Feeding a Mare After Foaling

After a mare foals, do you step up her feed?

Yes, we do. We take it by gradual procedure. In fact we notice that quite a few mares, even before foaling, will cut themselves back. Going back to the first part of the question—how we can judge the amount of flesh the mare is carrying—the paunch will sometimes fool you, which she may carry for the rest of her life. You can't get rid of that. The only thing I can say to that is close observation is required at all times. After a mare foals, naturally she's in for a change, if she's got a normal sized foal. I'd continue to step up her feed to what I actually think she should handle.—*Howard Endicott*

Culture of the Cervix can be carried out conveniently by inserting swab sticks through the rubber stopper of a bleeding tube. The whole unit can be sterilized. To obtain the sterile culture place the swab stick in the end of an insemination pipette which supplies the needed reach. When finished, place stopper and swab stick back in the sterile blood vial.



Major research developments do not occur every day. This month two independent reports arrived dealing with a highly important development.

Superior canine distemper vaccines produced in tissue culture is top priority news for veterinarians but the technical knowledge reflected could be even more important. It could well signal a breakthrough that could supply missing answers to the perplexing canine distemper problem.

In view of present Washington hearings, these following reports serve as a timely reminder of the tremendously competitive and efficient private research that serves our profession and its clients better than any in the world.

AN EFFECTIVE CANINE DISTEMPER TISSUE CULTURE VACCINE

C. J. YORK, D.V.M., Ph.D., J. L. BITTLE, D.V.M., G. R. BURCH, D.V.M. and D. E. JONES*

Introduction

Since canine distemper virus is responsible for the greatest proportion of infectious illness in the dog population, effective prevention of this disease is a major concern of veterinarians. Vaccines to protect against distemper have been available for many years, but research has continued to improve their usefulness and efficacy. Satisfactory vaccines incorporating egg-adapted, modified live canine distemper virus are presently in general use, but even these have some shortcomings, such as the presence of a rather large amount of foreign protein and the necessity to inoculate a large amount of virus to initiate an immunological response. Recently, in this laboratory, a modified tissue culture-adapted live canine distemper vaccine has been developed which is capable of eliciting a rapid, high antibody response when administered in a small, cell-free inoculum. Information on its effectiveness in dogs is presented in this paper.

Vaccine

The vaccine used in these studies was developed by selecting a strain of canine distemper virus previously modified by approximately 40 passages in embryonated eggs, and by adapting it to a chick embryo tissue culture system. Details of this work will be published elsewhere. The final vaccine consisted of tissue culture distemper virus combined with appropriate materials to insure stability, and was administered subcutaneously to dogs in a 1.0 ml. inoculum.

Virus Titrations and Serum Neutralization Tests

Details of these procedures have been published elsewhere.[1,2,3] Briefly, however, the infected tissue culture fluid or dried vaccine restored with 1.0 ml. of diluent was prepared in serial 10-fold dilutions in saline. For each dilution, the chorio-allantoic membranes of 4 or more 8-day-old embryonated eggs were inoculated with 0.1 ml. of virus suspension per egg. The eggs were then incubated for 6 days, after which the membranes were examined for plaques produced by the distemper virus. The number of egg-infectious doses 50% (EID_{50}) of virus contained in 1.0 ml. of vaccine was then calculated.

For the serum neutralization test, serial 10-fold dilutions of a serum sample were prepared. Each dilution was mixed with an equal amount of suspension containing approximately 100 EID_{50} of egg-adapted distemper virus. These mixtures were held at 4° C. for approximately 18 hours, and

*Research Division, Pitman-Moore Company, Indianapolis, Indiana.

inoculated into eggs as described above. The neutralizing ability of distemper antibodies in 0.05 ml. of dog serum was then determined.

Antigenic Potency

In order to determine the exact antigenicity of any live virus vaccine, the minimum number of virus infectious units necessary to immunize the natural host — in this case, the dog — must be established. Work reported by Ott and Gorham[4] and Burgher *et al.*[5] indicated that somewhere between 50 and 250 EID_{50} of egg-cultivated distemper vaccine virus would be required to immunize a dog, whereas Piercy[6] reported that between 1,000 and 3,000 virus units were necessary to produce such a response.

A series of four experiments was designed to obtain information on the potency of the virus used in this vaccine. In each experiment, serial 10-fold dilutions of tissue culture vaccine were prepared, and each dilution was inoculated both into embryonated eggs to determine the virus titer and into 2 to 4 dogs to determine immunizing ability. Serum samples for serum neutralization tests were taken from each dog at the time of inoculation, and again 3 to 4 weeks later. The minimum number of virus infectious units necessary to immunize a dog was established by determining the dilution producing a 50% immunity endpoint in dogs, and calculating the number of virus infectious units in this dilution. In two experiments, each dog was also given a full dose of modified live infectious canine hepatitis virus vaccine in order to learn whether this would interfere with the immunological response to distemper virus. The results, summarized in table 1, demonstrated that between 1 and 8 infectious units of virus (or an average of 3.5) were required to produce an immune response. Furthermore, no significant difference in antibody level was obtained whether the dogs received a large or a very small amount of virus (graph 1). In addition, titrations of the canine distemper virus in dogs, with and without infectious hepatitis virus, showed that the latter virus had no effect on the development of distemper antibodies. Conversely, the distemper virus did not prevent a full immunological response to the hepatitis virus.

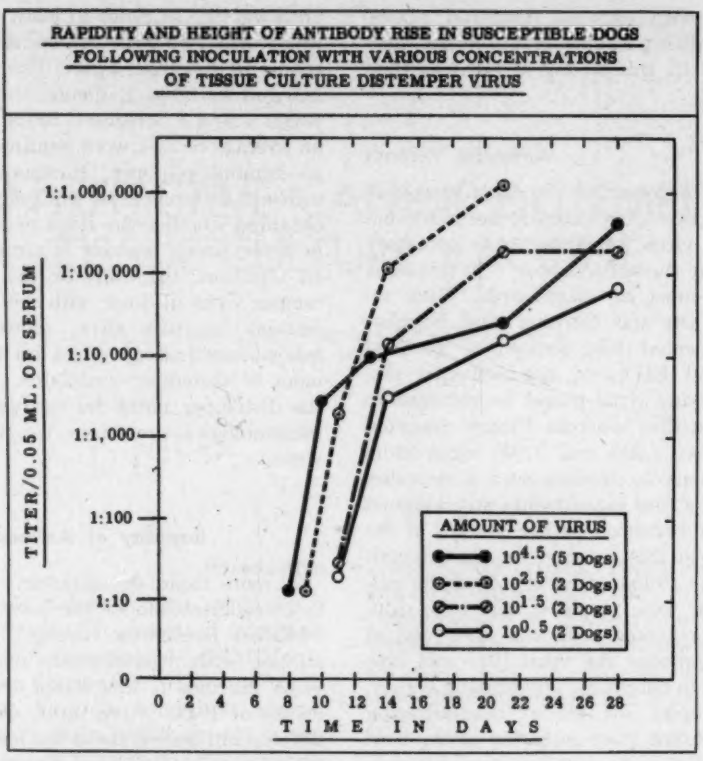
Rapidity of Antibody Response

A more rapid development of immunity is considered one of the advantages of a modified live virus vaccine. In previous studies with egg-adapted, live distemper virus vaccines it was found that, using in excess of 10,000 virus units, dogs began to develop antibodies about the tenth day after inoculation.[7] The time necessary for the development of antibodies after inoculation with tissue culture vaccine was determined by vaccinating 5 dogs and drawing serum samples every two days for two weeks, as well as on the twenty-first and twenty-eighth day. Six dogs receiving various dilutions of vaccine (as described under the antigenic studies) were also bled at regular

TABLE 1. Antigenic Potency Tests in Dogs, Using Tissue Culture Modified Live Canine Distemper Virus Vaccine

	Test 1*	Test 2*	Test 3	Test 4
No. of dogs	14	13	14	9
Inoc. per dog	1 ml.	1 ml.	1 ml.	1 ml.
Virus concentration in vaccine per ml.	$10^{4.3}$	$10^{5.5}$	$10^{5.5}$	$10^{4.5}$
50% immunity endpoint in dogs	10^{-4}	$10^{-4.8}$	$10^{-5.0}$	$10^{-4.5}$
No. virus units to immunize	2	8	3	1

*Each dog in these tests was inoculated simultaneously with over 5,000 virus units of modified canine hepatitis virus.



Graph 1

intervals. Serum neutralization tests were performed on all samples. The results of these tests, plotted on graph 1, show the beginning, as well as the height, of antibody response.

Graph 1 also shows that larger concentrations of virus produced low antibody titers by the eighth day. In fact, one dog developed a titer of 1:10 as early as the fifth day. When decreasing amounts of virus were inoculated, a delay of 2 to 4 days occurred before a response. Antibodies could be detected by the eleventh day when as few as 3 virus infectious units were inoculated. All animals, even when inoculated with a very small amount of virus, had titers above 1:1000 by the end of 14 days. However, the peak of antibody response was not reached for 28 days.

Degree of Effectiveness

Although the titrations in dogs showed that the virus composing this vaccine is highly immunogenic, it was considered equally important to know how effective it would be in a larger group of dogs. Therefore, other dogs were vaccinated by a number of veterinary practitioners in various parts of the country. Serum samples were taken from each dog at the time of vaccination, and again 3 to 4 weeks later. All serums were evaluated for antibodies by the serum-neutralization test. Results with 61 susceptible dogs vaccinated in the field and 44 in the laboratory are grouped according to age, and summarized in table 2.

The average titer for these dogs was 1:125,000 per 0.05 ml. of serum, a very high antibody response for a distemper vaccine. In previous studies[5] with a chick embryo live virus vaccine, an average titer of only 1:1500 was obtained. However, even with the tissue culture vaccine, the individual variation in antibody response was rather wide, ranging from a low of 1:160 to more

than 1:1,000,000. Four of the 105 dogs failed to develop any antibodies during the 3 to 4 week post-vaccinal period. It is important to recognize that such failures, as well as occasional low titers, are to be expected and represent individual biological variation.

Duration of Immunity and "Booster" Effect

These experiments have not been under way for a sufficient period to provide long-term data on the duration of immunity after vaccination. Studies with 4 dogs, however, showed that no significant change occurred during observation for 4 months under isolation conditions. The titers averaged about 1:100,000 during this period.

Neither has time permitted the accumulation of a group of dogs possessing an active immunity, but whose antibody has dropped to a low titer over an extended period. However, in order to learn whether the tissue culture vaccine would produce a booster response, 8 dogs were re-inoculated 4 to 6 months after primary vaccination, even though their average titer at the time was 1:150,000. The results are shown in graph 2. A rise in titer began on the fifth day after inoculation, and in 10 days reached a peak that normally would not be expected as a result of vaccinating susceptible dogs.

Safety

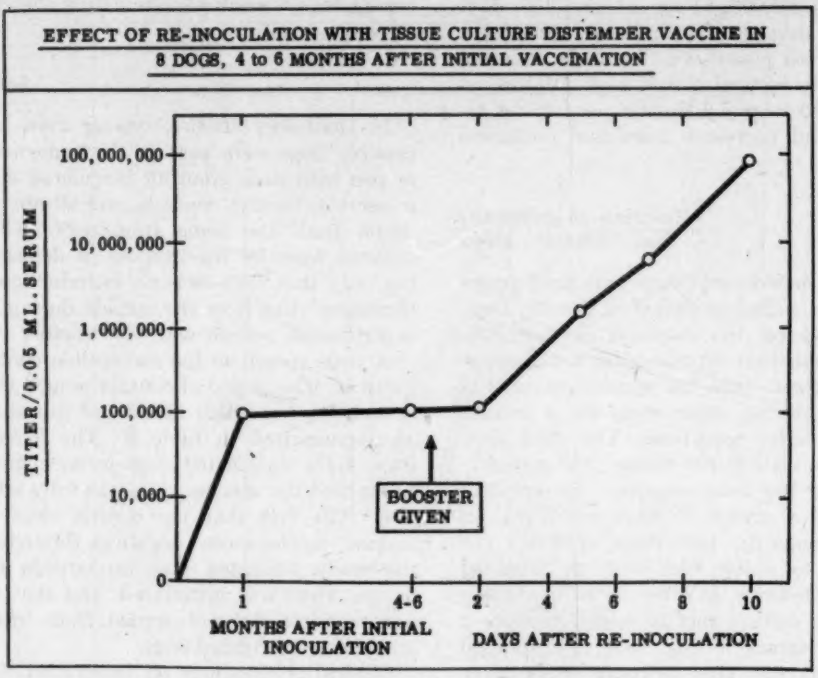
In laboratory studies, two or more susceptible dogs were kept in the same room or pen with each group of inoculated dogs, to serve as contact controls, and all ate and drank from the same containers. These controls were for the purpose of determining: (1) that there was no introduction of distemper virus from the outside during the experimental period; and (2) whether vaccine virus spread to the susceptible contact controls. The period of contact ranged from 3 weeks to 4 months. Results of this study are summarized in table 3. The average titer of the vaccinated dogs in each group shows that the vaccine virus was fully effective. The fact that the control dogs remained serologically negative throughout the study indicated that no outside distemper virus was introduced, and that the vaccine virus did not spread from inoculated to un-inoculated dogs.

Clinical observations on vaccinated dogs in the laboratory, as well as temperature records kept on most experimental dogs, provided further evidence of vaccine safety. At no time were there any signs of illness following inoculation.

TABLE 2. Results of Vaccination of Serologically Negative Dogs With Tissue Culture Distemper Vaccine

Age of Dog	No. of Dogs	No. Dogs Developing Immunity	Antibody Titer* (3 weeks post vac.) Average	Range
9 weeks or less	8	6	45,000	5000-100,000
10 thru 12 weeks	37	36	116,000	160-1,000,000
13 thru 16 weeks	31	30	128,000	320-1,000,000
5 thru 6 months	18	18	167,000	500-1,000,000
7 mos. thru 1 year	9	9	145,000	3200-1,000,000
Over 1 year	2	2	21,000	10,000-32,000
Total	105	101 (96.2%)	125,000	

*Antibody titer/0.05 ml. of serum.



Graph 2

Discussion

The quality of a live virus vaccine can be judged by the number of virus infectious units necessary to initiate an immunological response, as well as by the height of antibody level obtained. Obviously, the fewer virus units required to immunize an animal, the more effective the vaccine.

In a theoretically "perfect" vaccine, one virus unit would be equivalent to one immunizing dose. The tissue culture distemper virus described in this paper approximates this ratio, since it was found that an average of 3.5 virus units initiated a significant antibody response in dogs. This fact would indicate that the tissue culture vaccine virus is at least 50 times more potent than generally appears to be the case with live virus distemper vaccines prepared in embryonated eggs. The fact that an average titer of 1:125,000 was obtained with more than 100 dogs furnished additional evidence of effectiveness.

Dogs with a high antibody response, of course, may not be any more resistant to a challenge with virulent virus at the moment than those with a somewhat lower antibody level. However, it would seem logical that if all antibodies deteriorate at about the same rate, then dogs with a higher initial response would be afforded protection for a longer period of time. How long this immunity might last has yet to be determined. It must be emphasized, however, as shown in graph 1, that a full dose of vaccine should be administered to assure a rapid, high antibody response.

Since the tissue culture distemper and tissue culture infectious canine hepatitis viruses do not interfere with each other in any way when injected simultaneously, their use in a combined vaccine is entirely practical.

While the reasons for the improved performance of tissue culture-propagated distemper vaccine have not yet been definitely determined, one or all of the following three possibilities may be involved: (1) A particularly antigenic strain of virus may have been selected in the process of adaptation to tissue culture; (2) It is possible that

TABLE 3. Summary of Study Showing Lack of Spread of Virus From Vaccinated to Susceptible Contact Control Dogs

Group No.	No. of Dogs	Pre-Inoc. Serum Titer	Average Post-Inoc. Serum Titer*	Interval of Contact
1	4 vaccinates	Neg.	1:105,000	3 weeks
	6 controls	"	Neg.	
2	8 vaccinates	Neg.	1:200,000	4 weeks
	2 controls	"	Neg.	
3	11 vaccinates	Neg.	1:43,000	3 weeks
	14 contacts	"	Neg.	
4	5 vaccinates	Neg.	1:2,150,000	4 weeks
	4 controls	"	Neg.	
5	6 vaccinates	Neg.	1:53,000	4 weeks
	2 controls	"	Neg.	
6	4 vaccinates	Neg.	1:170,000	16 weeks
	6 controls	"	Neg.	

*Titer of antibody level in 0.05 ml. serum.

large amounts of foreign protein present in egg-cultivated vaccines may serve to bind vaccine virus. Since the tissue culture vaccine contains little foreign protein, fewer virus particles would therefore be required to initiate multiplication in the dog; (3) The chemical composition of viruses grown in the egg and in tissue culture may be different, with a consequent difference in their ability to multiply in the dog. In practice, it may be that more than one explanation is correct, and that the tissue culture procedure has allowed for the selection of a more potent strain of virus that can be used without the necessity of inoculating a rather large quantity of foreign protein.

Summary

A tissue culture modified live virus canine distemper vaccine has been developed which is capable of immunizing a dog with between 1 to 8 (average 3.5) EID_{50} of virus. Antibodies appeared as early as 5 to 8 days with inoculation of 1,000 or more EID_{50} of virus, although a few more days were required to produce a detectable serological response if smaller amounts of virus were injected. Studies with 105 dogs demonstrated that 96.2% developed a definite immunological reaction, with an average titer of 1:125,000 per 0.05 ml. of serum obtained within 3 to 4 weeks after vaccination. It was also demonstrated that this vaccine is capable of producing a significant booster effect.

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TISSUE CULTURE MODIFIED CANINE DISTEMPER VACCINE

by

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Since the first developments were made in canine distemper immunizing agents, and even with the subsequent improvements, there has remained one primary need in veterinary practice—a better distemper vaccine. The ideal would be a vaccine that would completely protect all dogs against true distemper and the distemper-like syndrome. Ideally, it would do this in spite of individual variations among dogs, in spite of vaccine handling methods, and in spite of immunization technics. Present work indicates some significant steps toward that ideal.

The combination of a carefully selected virus (selected for its antigenic properties), improved modification, propagation, production, and stabilizing technics now appears to offer real promise for a product significantly better than present vaccines.

The real test of any product is what it will do day in and day out in practice. Evidence indicates that a new modified virus vaccine of tisue culture origin will give practitioners a product to better meet that test.

The particular long range research project from which this vaccine resulted had as its goal the production of a more effective and safer vaccine for the control of canine distemper. The limitations of killed virus, ferret tissue live virus, and attenuated live virus (CEO) as effective vaccines are adequately documented by numerous authorities.[1,2,3,4,5]

This report deals with certain aspects of this new vaccine and is primarily concerned with the high antibody response which is elicited by its injection into dogs. Since much of our work is of basic research interest, this is being reported elsewhere.[6]

Methods

Since reporting the propagation of CDV in tissue culture dog kidney cells,[6] the tissue culture adapted virus was serially passed into dog kidney monolayer in 8 oz. Blake bottles—88 percent Earle's balanced salt solution, 10 percent lactalbumin hydrolysate, and 2 percent horse serum. The fluid was harvested from the bottles during the period when cytopathogenic effect in dog kidney cells was observed. The harvested fluid was later titered in 7- to 8-day old embryonated eggs according to the technique of Gorham.[8]

These results show that the quantity of virus was increased with successive passages in kidney monolayer. Using

TABLE 1. Immunity Response of Ferrets to Tissue Culture Distemper Vaccination

CDV-Tissue-Culture Vaccine (lyophilized)	Ferret Number	Pre-Vaccination* titer-serum dilution[1]	14 days Post-Vaccination* titer serum dilution[1]	Results of Challenge
Serial No. 1 2,500 $E.I.D._{50}$ per ferret	236	less than 1:40	1:160	NS
	237	" 1:40	1:160	NS
	238	" 1:40	1:320	NS
	239	" 1:40	1:160	NS
	240	" 1:40	1:320 or higher	NS
Serial No. 2 2,500 $E.I.D._{50}$ per ferret	241	" 1:40	1:160	NS
	242	" 1:40	1:320	NS
	243	" 1:40	1:320 or higher	NS
	244	" 1:40	1:160	NS
	245	" 1:40	1:320	NS
Serial No. 3 5,000 $E.I.D._{50}$ per ferret	246	" 1:40	1:320 or higher	NS
	247	" 1:40	1:320	NS
	248	" 1:40	1:320 or higher	NS
	249	" 1:40	1:320 or higher	NS
	250	" 1:40	1:320	NS
Contact Control	251	" 1:40	less than 1:40	D—14 days
	252	" 1:40	" 1:40	D—15 days
	253	" 1:40	" 1:40	D—12 days
	254	" 1:40	" 1:40	D—15 days
	255	" 1:40	" 1:40	D—14 days

Snyder Hill strain of CDV was used for challenge. 100 $E.I.D._{50}$ of CDV chick embryo origin (50-52 passage) was employed in the SN test.

*These titers represent complete neutralization.

[1]Per 0.1 ml. of serum.

NS—No signs of distemper.

D—Ferret died on days after challenge.

suitable stabilizers a tissue culture distemper virus was prepared and tested in ferrets and dogs.

Immune Response

Ferrets — these were identified and bled to determine their susceptibility to distemper on the basis of the serum neutralization test. Only susceptible ferrets were then used. Fifteen ferrets were vaccinated subcutaneously with 0.5 ml. of Serials 1, 2, and 3 tissue culture vaccine. Five non-vaccinated ferrets were kept with the vaccinates as in contact controls. At 14 days post-vaccination the ferrets were bled to determine antibody titer. At that time each animal, including the unvaccinated controls, was challenged with live distemper virus by intramuscular injection using 0.5 ml. of 1:10 spleen tissue suspension of a virulent CDV strain (Snyder Hill strain). The post-vaccinal serum samples were studied by the serum neutralization test. In running the serum neutralization test the serum virus mixture was held for 2 hours in a water bath at 4 degrees centigrade. This is in direct agreement with work previously outlined by Baker. More prolonged exposure by non-specific inactivation of virus may produce misleadingly high titers. These studies are reported in table 1. High antibody titers were produced in vaccinated ferrets, and none showed signs of distemper following challenge with live virus. On the other hand, all five non-vaccinated controls died between the 12th and 15th day following challenge.

Dogs — Forty-three dogs, age 2½-4½ months were the subjects of a similar immune response test. These were bled to determine their distemper susceptibility on the basis of the serum neutralization test. They were arranged into vaccinates and non-vaccinated in-contact controls, as shown in table 2. Dogs

designated as vaccinates were given 2 ml. of the tissue culture vaccine by subcutaneous injection. All dogs were bled between 14 and 21 days following vaccination and serum neutralization tests conducted. The antibody response is reported in Table 2. Following this bleeding, both vaccinates and controls were challenged with virulent distemper virus (1.5 ml. Snyder Hill 1:10 spleen suspension) by intramuscular injection. As with the ferrets, daily clinical examination was conducted on all dogs and body temperatures recorded up to a maximum of 31 days post-challenge. The controls developed the classical distemper febrile response together with typical clinical symptoms.

TABLE 2. Immunity Response of Dogs to Tissue Culture Distemper Vaccination

Trial	Dog No.	Age	Breed	Sex	Weight in lbs.	Pre-Vac. Titer* serum dilution[1] screen test	14-21 days* Post-Vac. Titer serum dilution[1]	Results of Challenge
A								
Serial 1	527	3	CS	F	8	less than 1:40	1:160	NS for 30 days
10,000	528	3	CS	F	10	" 1:40	1:320	"
EID_{50}/dog	532	3	CS	M	10	" 1:40	1:160	"
	533	3	CS	F	8	" 1:40	1:160	"
"	534	3	CS	F	8	" 1:40	1:320	"
	546	4½	SH	M	15	" 1:40	1:160	"
Serial 3	548	4½	SH	M	12	" 1:40	1:80	"
20,000	549	4½	SH	F	15	" 1:40	1:160	"
EID_{50}/dog	550	4½	SH	F	15	" 1:40	1:160	"
	551	3	CS	M	10	" 1:40	less than 1:40	DS
Contact	552	4½	SH	F	18	" 1:40	" 1:40	DS
Control	553	4½	SH	F	15	" 1:40	" 1:40	DS
B	554	4	BT	F	10	" 1:40	1:80	NS for 31 days
Serial 1	555	4	BT	F	12	" 1:40	1:320	"
	556	4	BT	M	12	" 1:40	1:320 or higher	"
	557	4	BT	M	11	" 1:40	1:160	"
Serial 2	558	4	BT	F	10	" 1:40	1:160	"
10,000	559	4	BT	M	13	" 1:40	1:160	"
EID_{50}/dog	560	3	CL	F	10	" 1:40	1:160	"
	561	3	CL	M	12	" 1:40	1:160	"
	562	3	CL	M	12	" 1:40	1:160	"
Serial 3	563	4	SH	F	15	" 1:40	sample broken	"
	564	4	SH	F	16	" 1:40	1:160	"
	565	4	SH	F	14	" 1:40	1:320 or higher	"
	566	4	BT	M	12	" 1:40	less than 1:40	DS
Contact	567	3	CL	M	12	" 1:40	" 1:40	DS
Control	568	4	SH	F	14	" 1:40	" 1:40	DS
C	570	2½	FT	F	5	" 1:40	1:320	NS for 28 days
Serial 1	571	2½	FT	F	7	" 1:40	1:320 or higher	"
	572	2½	FT	M	8	" 1:40	1:160	"
	573	3	FT	F	5	" 1:40	1:160	"
	574	4	SH	F	12	" 1:40	1:320	"
Serial 2	575	4	SH	F	14	" 1:40	1:80	"
	576	4	SH	F	15	" 1:40	1:320 or higher	"
	577	4½	FT	F	8	" 1:40	1:320 or higher	"
	578	4½	FT	F	10	" 1:40	1:80	"
Serial 3	579	4	CL	M	15	" 1:40	1:320	"
	580	4	CL	F	12	" 1:40	1:160	"
	581	4	CL	F	12	" 1:40	1:320 or higher	"
	582	4½	FT	M	10	" 1:40	less than 1:40	DS
Contact	583	2½	FT	F	6	" 1:40	" 1:40	DS
	584	4	CL	M	12	" 1:40	" 1:40	DS
Control	585	4	SH	M	14	" 1:40	" 1:40	DS

*These titers represent complete neutralization.
[1]Per 0.1 ml. of serum.
CS—Cocker Spaniel; SH—Shepherd; FT—Fox Terrier; BT—Bull Terrier; CL—Collie.
F—Female; M—Male.
NS—No sign of canine distemper; DS—Canine Distemper Signs.
Snyder Hill strain was used to challenge the dogs. 100 $E.I.D._{50}$ of CDV chick embryo origin (50-52 passage) was employed in the SN test.

Safety

It was noted that in-contact, non-vaccinated controls did not develop distemper within 14 to 21 days following vaccination of their companions. There was thus no evidence of spread of vaccine virus in dogs or ferrets which would indicate reversion to virulence.

Antigenicity

The vaccine Serial 3 was titered in embryonated eggs and serial dilutions prepared. These latter represented 10, 20, 40, 200, 200, and 500 EID_{50} in a 2 ml. dose of vaccine. On the basis of the Serum Neutralization test, 20 susceptible dogs were chosen with the exception of 5 in-contact controls. The remainder were vaccinated with various numbers of virus particles as shown on Table 3. All dogs were bled 13 to 23 days after vaccination and serum neutralization tests conducted. A very satisfactory immune response was obtained in all vaccinates including those dogs receiving 10 EID_{50}. Both vaccinates and controls were then challenged with virulent distemper virus as reported in the previous experiment. Daily body temperatures and clinical examinations were conducted for an additional 28 days. Vaccination at all dosage levels afforded solid protection. All non-vaccinated controls developed distemper within the 28-day observation period. This work indicates that immunity to challenge virus in dogs may be produced with as low a dose of this tissue culture distemper vaccine as 10 EID_{50}. While this has been the minimum dose used in these experiments, further reports will demonstrate the antigenic response of 1-10 EID_{50} of this tissue culture distemper vaccine.

Discussion

While several factors are involved in canine distemper immunization, one of the most important is the quality of the vaccine. We have demonstrated:

TABLE 3. Minimum Egg Infectious Dose ($E.I.D._{50}$) of Tissue Culture Vaccine to Immunize Dogs

$E.I.D._{50}$ of virus per animal	Dog No.	Pre-Vac. Titer* serum dilution[1] screen test	13-23 days Post-Vac. Titer* serum dilutions[1]	Results of Challenge
10	497	less than 1:40	1:40 or higher	NS for 28 days
	498	" 1:40	1:40 "	"
20	494	" 1:40	1:40 "	"
	495	" 1:40	1:40 "	"
	496	" 1:40	1:40 "	"
40	505	" 1:40	1:40 "	"
	506	" 1:40	1:40 "	"
100	504	" 1:40	1:40 "	"
	507	" 1:40	1:40 "	"
200	508	" 1:40	1:40 "	"
	512	" 1:40	1:40 "	"
	509	" 1:40	1:40 "	"
500	490	" 1:40	1:40 "	"
	491	" 1:40	1:40 "	"
	492	" 1:40	1:40 "	"
Control	493	" 1:40	less than 1:40	DS
	499	" 1:40	" 1:40	DS
	500	" 1:40	" 1:40	DS
	510	" 1:40	" 1:40	DS
	511	" 1:40	" 1:40	DS

*These titers represent complete neutralization.
[1]Per 0.1 ml. of serum.
NS—No signs of distemper.
DS—Canine distemper signs.
Snyder Hill strain of CDV was used for challenge. 100 $E.I.D._{50}$ CDV chick embryo origin (50-52 passage) was employed in the SN test.

1. Safety with no adverse reaction to injections or spread of vaccine virus to in-contact ferrets and dogs.

2. High antigenicity with as low a dose as 10 EID_{50}, with research in program to determine the true end point.

In our tissue culture system the titer of virus has been significantly increased. Since the effectiveness of the vaccine depends on the number of EID_{50} injected, an important advance has thus been made. The tissue culture vaccine contains little foreign protein unlike the large amounts present in CEO vaccine.

Clinical trials with this vaccine will be reported elsewhere as will antibody response of dogs at 5 to 10 days following vaccination.

Summary

A tissue culture modified live virus canine distemper vaccine has been produced. Virus titers on dog kidney monolayer have been greatly increased. Tests herein reported include studies in 63 dogs and 15 ferrets. Protection has been demonstrated with as low a dose as 10 EID_{50}, while search for an end point continues. In another experiment involving 43 dogs, a 2 cc. dose of vaccine showed protection on the basis of both serological evidence and challenge with virulent distemper virus.

Field reports on clinical evaluation will be reported at a later date.

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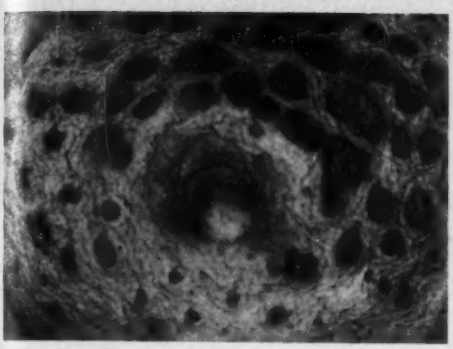
Anaplasmosis Carriers

A request from an Oklahoma practitioner for information about the diagnosis and handling of suspected anaplasmosis carriers has been received by this writer. The latest available information appears on page 66 of the Proceedings of the 1958 sessions of the United States Livestock Sanitary Association, as reported from Oklahoma State University.

Diagnosis of the "carrier" state is based on the complement-fixation test. Three groups of reacting animals were treated with chlortetracycline, mixed in cottonseed meal feed, at the rate of 1.5 mg., 2½ mg. and 5 mg. for each pound of body weight. Daily administration of the antibiotic was continued for 60 days. All animals were negative before the end of the 60 day period as demonstrated by the complement-fixation test, and by hematologic methods.—*R. R. Dykstra, D.V.M.*



Swine pox illustrating typical lesions on the mammae.

DISEASES OF BABY PIGS

Part 4. Diseases Manifest by Skin Lesions

by C. L. VICKERS, D.V.M.
Columbia, South Carolina

A severe case of seborrhea oleosa in a pig.

The first disease condition to fall under the category of diseases manifest by skin lesions is exudative epidermitis or greasy pig disease.

Cause. The cause of this disease is unknown.

Predisposing Causes. No predisposing causes are known.

Age Incidence. This condition occurs at one to four weeks of age.

Signs of the Infection. The first signs are a slight inappetence, a dull appearance of the skin and hair, and dandruff or scales begin to appear on the skin surface. As the condition progresses, the skin becomes thickened, and the pig's attitude may vary from restlessness to dejection. There is a loss of appetite in varying degrees but an increased thirst. No pruritis is observed and temperature usually remains normal. Occasionally, however, a rise in temperature may be noted in the latter stages of the disease, probably due to a secondary bacterial infection. Pigs are usually constipated although diarrhea sometimes occurs. There is a loss in body weight.

As the skin secretions continue, there is a crust accumulation giving the appearance of scab formation. The crust occurs around the face, along the back and around the tail head. If the scab is removed, the skin appears raw and inflamed underneath. As the secretions continue, the skin has a greasy, sticky appearance. The exudate accumulates and dries and the entire skin surface appears roughened and wrinkled.

The color of the scales, and later the crust accumulation varies somewhat, depending on the color of the pig. On black pigs, it is gray; on red pigs it is reddish brown or rusty, and on white pigs it may appear orange. A peracute, acute, and subacute form occurs.

In the peracute form, death occurs in three to five days. In the acute form, death usually occurs in four to eight days, and in the subacute form, the skin becomes markedly wrinkled and the pigs may live for two to three weeks. The mortality rate is lower in the last form.

Mortality in general varies from 5% to 90%.

Dehydration and emaciation are evident at necropsy. There are no specific internal lesions peculiar to this condition.

Diagnosis. The disease can be differentiated from parakeratosis on the basis of age, mortality, and response of the latter to treatment. It can be differentiated from vitamin deficiencies also by response to treatment and history. Demonstration of external parasites would differentiate it from these conditions. Since there is no known cause and no distinctive internal lesions are seen on necropsy, a diagnosis must be made on the basis of history, signs of the infection, and differentiation from other skin conditions.

Treatment. The skin should be cleaned manually, and the pigs dipped in a disinfectant, such as 2% pine oil. Supportive nutritional measures should be instituted. A treatment that is said to have some beneficial effect is ACTH Gel, 600 units in 5% Dextrose, and 5 cc. of this mixture given to each pig subcutaneously. The treatment should be repeated as indicated. Another treatment that has been used is 1 ounce of corn oil per pig per day.

Prevention. No preventive measures are known.

Necrobacillosis or Necrotic Stomatitis

Cause. Actinomyces necrophorous, an anerobe, is the cause of necrotic stomatitis.

Predisposing Cause. Fighting and teeth wounds are predisposing causes.

Age Incidence. Suckling pigs are the victims of this disease.

Signs of Infection. May be found in newborn, although most frequently found when deciduous teeth are being replaced. Pigs refuse to nurse, become listless, unthrifty and necrotic areas are noticeable on the mucous membranes of the mouth, tongue, face or skin of legs. In some cases, the body skin may be involved. Pigs salivate and the lesions have a marked odor. Lesions may be observed on the udder of the sow. Cutaneous lesions are usually dry whitish areas that contain necrotic material and may extend deeply into underlying tissue. Scab formation occurs. Mortality rate varies from very low to a high incidence.

Necrotic areas may be found in the mucous membranes of the mouth and occasionally extend further into the digestive and respiratory tract.

Treatment. Improve sanitary procedures and remove scabs by scrubbing pigs with a disinfectant solution. Dust with a sulfa-urea preparation, sulfathiazole or the treatment of choice. Supplemental feeding of cod liver oil for five to seven days may be beneficial.

Sunburn

Cause. A dermatitis caused by action of ultraviolet rays upon the unprotected skin is the cause of sunburn.

Predisposing Cause. Young pigs with tender skin, or white swine of any age, placed in bright sunlight without a period of acclimation.

Signs of Infection. Severity of this condition is influenced by brightness of sun, length of exposure and sensitivity of skin. Erythema, edema, warmth to touch, evidence of pain, careful gait and squeal when contact is made with any object are all signs of the condition. After several days, thin layers of skin peel off. Burn may be so severe that ears and tails will necrose and slough.

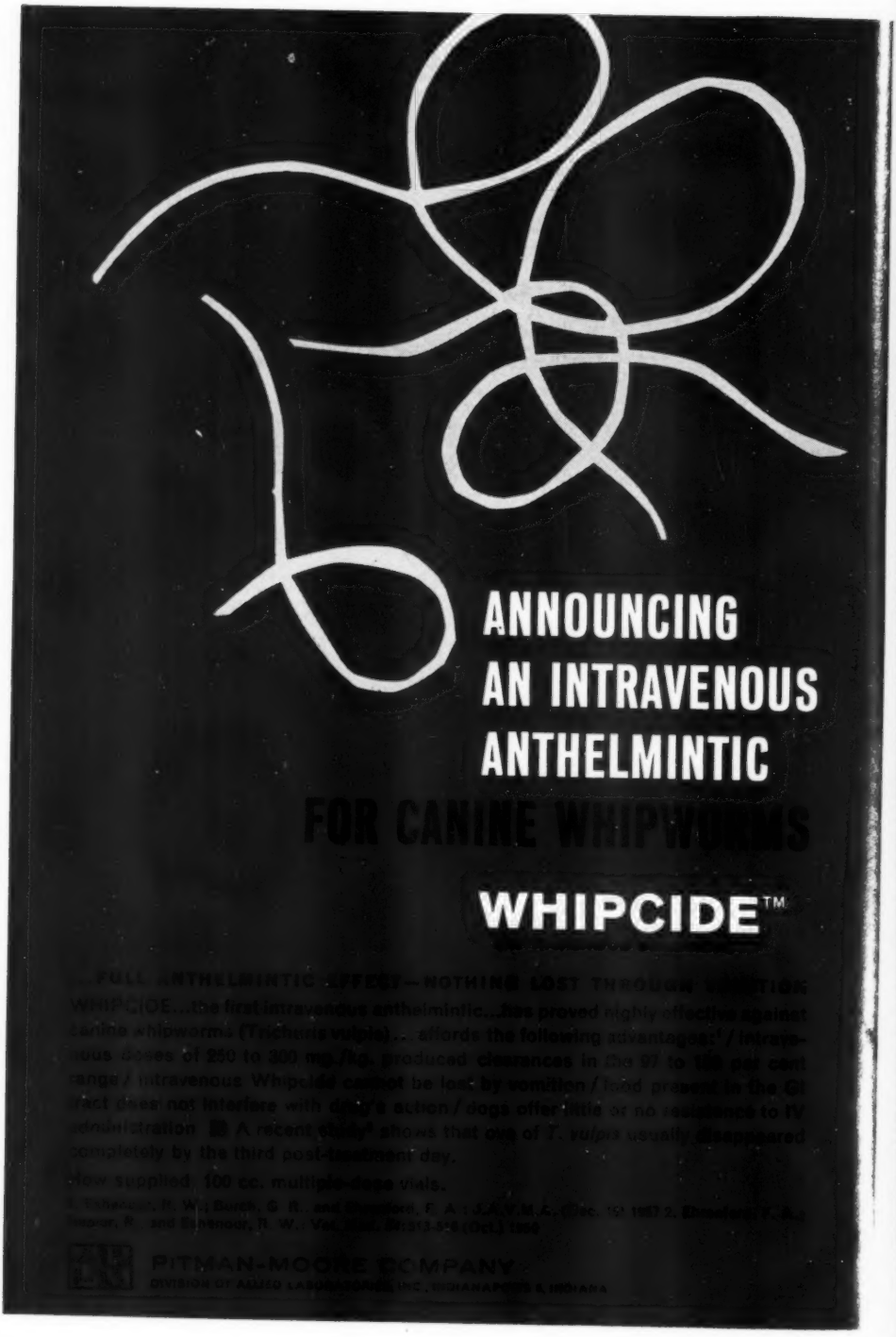
Diagnosis. History of unacclimated swine being exposed to the sun, and subsequently developing erythema, edema and the absence of a photodynamic agent provide the essentials for establishing a correct diagnosis.

Swine Pox

Cause. True swine pox is caused by a virus, *Variola suilla,* but cow pox or vaccina caused by the virus *Variola vaccina,* indistinguishable from the true swine pox, also occurs in swine. True swine pox is found only in swine, while cow pox may occur in a variety of animals. Recovery from either form of pox

(continued on page 67)

SMALL ANIMAL PRACTICE


ANNOUNCING
AN INTRAVENOUS
ANTHELMINTIC
FOR CANINE WHIPWORMS
WHIPCIDE™
...FULL ANTHELMINTIC EFFECT—NOTHING LOST THROUGH VOMITION
WHIPCIDE...the first intravenous anthelmintic...has proved highly effective against Canine whipworms (Trichuris vulpis) ... affords the following advantages:[1] / Intravenous doses of 250 to 300 mg./kg. produced clearances in the 97 to 100 per cent range / Intravenous Whipcide cannot be lost by vomition / food present in the GI tract does not interfere with drug's action / dogs offer little or no resistance to IV administration ■ A recent study[2] shows that one of 7 vulpis usually disappeared completely by the third post-treatment day.
Now supplied: 100 cc. multiple-dose vials.
PITMAN-MOORE COMPANY

POTENCY TESTING OF LIVE MODIFIED RABIES VACCINE

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WALTER E. CARLSON, B.A.
Fromm Laboratories
Grafton, Wisconsin

BEFORE ANY LOTS OF RABIES VACCINE, chick embryo origin, can be released for distribution to veterinarians for use in dogs, the efficacy of the modified live virus vaccines must be tested for potency in guinea pigs and for virulence in mice.

The potency of the vaccine is tested by injecting mature guinea pigs, weighing at least 350 gm., intramuscularly in a rear leg with 0.25 cc. of the vaccine under test diluted to a 5% tissue suspension. The vaccinated animals are challenged three weeks postvaccination with either a fixed (Habel mouse strain) or a street virus (dog origin) which will kill at least 80% of non-vaccinated pigs of the same age and weight which are challenged at the same time. For a satisfactory test of the efficacy of the respective lot of vaccine, at least 70% of the challenged vaccinates must survive, which represents a minimum survival difference of 50% between the vaccinates and controls. In actual testing, this difference usually is greater. For satisfactory testing, the lyophilized vaccine must have a mouse LD_{50} titer of no less than $10^{-3.5}$ per 0.03 cc. injected intracerebrally.

Recent government concern has stimulated much interest in the potency of live modified rabies vaccine at time of administration. The merits of this effort are universally recognized. It has been suggested that improved testing methods might aid achievement of this objective. This article presents a new method for consideration.

The fallacy of this type test, as it applies to the guinea pigs, lies in the assumption that all live virus rabies vaccines as distributed contain the same amount of chick embryo tissue per dog dose. Unless one knows the exact composition of any one respective vaccine, one cannot dilute to a uniform test suspension when comparing various types of vaccine containing unknown quantities of virus-bearing tissues. The immunizing vaccination dose for guinea pigs is so adjusted that some postvaccination deaths attributable to the vaccine and prior to actual challenge with virulent virus may occur. The test as outlined is satisfactory in determining the value of the suggested vaccine dilution with respect to the response in guinea pigs, but this method does not afford any true evaluation of the live modified virus vaccine for dogs.

Because foxes can be used in the potency testing of canine distemper vaccines and infectious canine hepatitis vaccines, and because they belong to the canine family and are natural hosts of rabies virus in the field, a series of studies was initiated to determine the efficacy of the Flury-type chick embryo origin vaccine under various environmental conditions by vaccinating and challenging foxes.

The vaccines used were standard commercial vaccines which had been released under the test standards as outlined. Foxes ranging from three to six months old were used in these preliminary tests,

and were distemper-infectious canine hepatitis immune. The dose used per animal was one vial of lyophilized vaccine reconstituted as for use in dogs.

The susceptibility of foxes to virulent virus, using various inoculation routes with varying doses, was determined first. Rabbit brain origin fixed virus of a strain originally isolated from a dog by the Illinois Department of Public Health was used as the challenge virus. Foxes were injected intracerebrally with 1.0 cc. 1% rabbit brain suspension; or with 0.5 cc. 0.1% intracerebrally; or with 0.1 cc. 10% suspension into each masseter muscle; or intramuscularly in a rear leg with either 1.0 cc. 10% suspension, 0.5 cc. 10% suspension, or 1.0 cc. 5% suspension. All routes were effective in producing paralysis and death in all injected animals. Using the intracerebral route, paralysis appeared as early as the fourth day postchallenge, as early as the sixth day using the masseter route, and as early as the seventh day when the animals were injected intramuscularly in a rear leg. The latest appearance of paralysis was on the twelfth day postchallenge in a fox injected intramuscularly in a rear leg.

Those foxes which were vaccinated were injected with the test vaccines intramuscularly as recommended for field use in dogs, using the right rear leg for uniformity in method. In these studies being reported, all challenges of vaccinated foxes were made three weeks postvaccination, again following the general outline used when potency testing with guinea pigs. In those groups challenged intramuscularly, the challenge virus was injected into the left rear leg. For ease in administration while handling foxes, the latter route is preferable when challenging. All paralyzed animals were euthanized after being moribund for 24-48 hours. Survivors were observed for 30 days postchallenge.

Eight lots of commercial live modified CEO virus vaccine were tested. The mouse MLD_{50} endpoints as determined by the method of Reed and Muench and the guinea pig potency tests of the vaccines tested in foxes are outlined in table 1 as tested shortly after processing.

From these testing results, it will be noted that between 90 and 100% of the challenged vaccinated guinea pigs survived challenge, with 80 to 100% mortality in the unvaccinated control animals. All of the mouse LD_{50} endpoints were above the minimum stipulated level used as a standard. It will be noted that there is no correlation between the virus content as determined by mouse mortality and the incidence of postvaccinal losses. Similarly, there is no correlation

TABLE 1

Vaccine Lot	Mouse MLD_{50} Endpoint	Guinea Pig Potency	
		Vaccinates	Controls
A	$10^{-4.21}$	No postvaccination losses 0/11*	5/5*
B	$10^{-4.68}$	1 postvaccination loss 0/10	4/5
C	$10^{-4.56}$	2 postvaccination losses 0/9	5/5
D	$10^{-4.68}$	2 postvaccination losses 1/9	5/5
E	$10^{-4.00}$	2 postvaccination losses 0/9	4/5
F	$10^{-4.50}$	No postvaccination losses 1/11	5/5
G	$10^{-4.68}$	No postvaccination losses 1/11	5/5
H	$10^{-5.20}$	1 postvaccination loss 0/10	4/5

* Number dead/number challenged.

between the virus content as determined by mouse mortality and the survival ratio between vaccinated and control guinea pigs challenged simultaneously.

The potency of these vaccines was checked in foxes after varying periods of storage at 5 C. and at 37 C. The latter temperature was selected to accelerate any virus deterioration which might occur in the vaccines during refrigerator storage and to determine the stability of the vaccine under this abnormal stress condition. The length of time under various conditions was arbitrary and exploratory.

Table 2 shows the challenge results in foxes injected intramuscularly with vaccine which had been kept at 5 C. for periods ranging from seven to nine weeks after lyophilization. The same group of unvaccinated foxes served as controls for the vaccinates. All animals were challenged intramuscularly in the left rear leg.

TABLE 2

Vaccine Lot	Survivors/Total Injected	Protection %
F	9/9	100%
G	8/9	88%
H	8/9	88%
Controls	0/3	(100% mortality)

Table 3 shows the challenge results in foxes injected with vaccines which had been kept at 5 C. for varying periods after lyophilization and then heated at 37 C. as indicated. All of these animals together with unvaccinated controls were challenged using the masseter route.

Table 4 shows the results in foxes injected with vaccines which had been kept at 5 C. from 8 to 14 weeks and then heated at 37 C. as indicated. All of these animals together with unvaccinated controls were challenged intramuscularly in the left rear leg.

The results of these studies would indicate that the fox can be used as an alternate test animal instead of the guinea pig in determining the potency of Flury-type rabies vaccines, affording a method of comparing in a member of the canine family the relative efficacy of vaccines based on the actual total vialed dosage of chick embryo tissue in each individual container just as it would be used in clinical practice. Preliminary results also indicate that the fox can serve as a test animal in determining the relative stability of lyophilized vaccines, as demonstrated by vaccination with heated vaccines and subsequent challenge. Further studies on vaccines stored or shipped under various environmental conditions, serological response to vaccination, and other related studies are in progress.

TABLE 3

Vaccine Lot	Time Refrig.	Time Heated	Survivors/ Total Injected	% Protection
A	12 wks	4 days	3/3	100%
D	5 wks	13 days	3/3	100%
E	4 wks	13 days	3/3	100%
Controls			0/6	(100% mortality)

TABLE 4

Vaccine Lot	Time Refrig.	Time Heated	Survivors/ Total Injected	% Protection
B	14 wks	12 days	3/3	100%
C	13 wks	12 days	3/3	100%
F	10 wks	12 days	3/3	100%
G	9 wks	12 days	3/3	100%
H	8 wks	12 days	3/3	100%
Controls			0/3	(100% mortality)

Fig. 1

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Fig. 2

Clinical trials reported here cover successful topical treatment of ringworm caused by M. canis, M. gypseum, T. equinum, pyogenic dermatitis, seborrheic dermatitis, demodectic and sarcoptic acariasis in dogs, cats and horses, by the dermatologic clinic of the School of Veterinary Medicine of the University of Pennsylvania.

Fig. 3

Skin Infections in Animals

PRELIMINARY EXPERIENCES WITH A NITROFURAN PREPARATION

IN ANIMALS, the frequency of skin disorders resulting from infections and infestations is relatively high. Among these, three conditions are of special interest, particularly in small animal practice: dermatitides of bacterial, fungal or acarian causation. In recent years, among the preparations developed for the topical treatment of such conditions a liquid nitrofuran, nitrofurfuryl methyl ether (Furaspor — Eaton Laboratories) has been tested by the dermatologic clinic of the School of Veterinary Medicine of the University of Pennsylvania.

This experimental clinical study using Furaspor Liquid Veterinary* was performed on animals with dermatomycoses (ringworm caused by Microsporum or Trichophyton sp.) and dermatitides (pyoderma, dermatitis seborrheica, demodectic and sarcoptic mange).

Dermatomycoses

Ringworm was treated in dogs, cats and horses; the causative agents being *M. canis, M. gypseum* and *T. equinum,* respectively.

Microsporum canis Infection. Ringworm caused by *M. canis* (figure 1) was treated in 18 dogs. First, the skin lesions covered with crusts and scales were scraped and then Furaspor was applied to the infected areas with a stiff-bristle brush or rough cloth for one to two minutes, twice daily for the first four days, then once daily for four to six more days. After this treatment, as a rule, ultra-violet fluorescence disappeared and the lesions cleared. Later, the hair started to grow and the originally affected skin did not show any lesions. Of the 18 treated dogs, 12 recovered completely; fluorescence disappeared, skin lesions cleared and the hair started to grow. Cultures made from skin scrapings of cured dogs were negative. To date, ten of the cured dogs have not shown any recurrence of ringworm; and two other dogs developed ringworm on other parts of the body which originally did not show any lesions. Of the six dogs not cured, all of which had lesions on large areas of the body surface, two were euthanized because of poor general condition. Four more did not show satisfactory response and treatment had to be repeated. After 14 days of the second treatment, two recovered completely, whereas two had to be treated for the third time, and to date, are still being treated.

Ringworm caused by *M. canis* was treated in 11 cats. Five cats showed skin lesions localized on the head, ears and extremities. The lesions were round, covered with scales and crusts and showed ultraviolet fluorescence. Treatment was applied in the same way as described for dogs. Furaspor was rubbed into the skin lesions daily for six days; then every other day for a total of four treatments. All localized lesions were

*A preparation containing 0.4% nitrofurfuryl methyl ether, 15% benzyl benzoate and 0.5% quaternary ammonium compound. Supplied by Eaton Laboratories, Norwich, New York.

cured in 18 days. Fluorescence disappeared, the skin lesions cleared and cultures of skin scrapings taken after 18 days were negative. Three cats with skin lesions on larger areas of the body surface were treated with Furaspor daily for 12 days. In two cats the lesions cleared and fluorescence disappeared. However, since cultures of skin scrapings from originally affected areas were still positive, treatment was repeated. These cats were cured and skin scraping cultures were negative after 16 more days of daily treatment. Three cats, severely affected over the entire body and in a generally poor condition, did not respond to treatment. One cat in poor general condition died and two were subjected to euthanasia.

Microsporum gypseum Infection

Ringworm caused by *M. gypseum* was treated in 10 dogs. All of them showed crusted skin lesions on various parts of the body. Four of these had lesions only on the head and extremities, and six showed lesions scattered over the entire body.

The first four cases were treated topically on the affected areas after scabs and scales were removed and then Furaspor was applied using a stiff-bristle brush for two minutes until the skin was very red and bleeding slightly. This treatment was given daily for 12 to 16 days. The skin lesions cleared, the hair started to grow and cultures of skin scrapings taken from the treated areas 24 days after termination of therapy were negative.

The six dogs with lesions scattered over the entire body were treated with Furaspor after the scabs and scales were removed. However, because lesions were found over the whole body, treatment was given the first day to one half of the body surface, and the other half the next day. This treatment was repeated eight times to each half of the body. At the same time, sodium iodide was administered *per os* for the first six days. Four of these six dogs were cured clinically after 16 days of treatment. Skin scrapings did not show any fungi on microscopy and cultures were negative. The two remaining dogs showed an essential improvement after treatment; although cultures of skin scrapings, taken from the lesions were still positive and it was necessary to repeat treatment for 12 more days. Both dogs then appeared cured clinically, skin-scraping cultures were negative in one dog but positive in the other, which now is being treated for the third time.

Trichophyton equinum Infection

Ringworm caused by *T. equinum* (figure 2) was treated in two horses. Lesions were located on the abdomen and thorax and were treated in the same way as described for dogs: the scabs and scales were scraped and Furaspor was rubbed into the affected areas for two minutes each day. The first horse was cured completely after eight treatments, the second after 11 treatments. In both, skin scraping cultures were negative at the end of therapy.

All treated cases of dogs, cats and horses with dermatomycoses showed a good antifungal activity of Furaspor. Only severe conditions, particularly in animals with a generally poor state of health, were more difficult to cure. There was no evidence of side effects or toxicity in any of the treated cases. The skin responded to the vigorous application of Furaspor with a severe erythema, sometimes even with some superficial bleeding; however, these signs disappeared within hours. The penetrating power of Furaspor has been considered an important supportive influence in the treatment of these dermatomycoses.

Dermatitides

Pyogenic Dermatitis. (Figure 3.) Subsequent to the use of Furaspor for ringworm infections the compound was employed in skin conditions caused by pyogenic infections. These conditions are found mainly in dogs. They appear either as superficial or deep pyogenic dermatitis. To date, superficial pyogenic dermatitis has been treated with Furaspor topically; at the same time, antibiotics or bismuth preparations were administered systemically to nine dogs with localized lesions of pyogenic dermatitis, and to two dogs with purulent external otitis. Cases with cutaneous lesions were treated with Furaspor by gentle rubbing or

painting of the affected areas, once or twice a day, depending on the extent of the lesions. This treatment was repeated daily for six to eight days. After four to six treatments the lesions became dry, and crusts and scales developed. The crusts were removed with oily preparations and the conditions cleared four to five days later. All nine dogs affected with superficial pyogenic dermatitis were cured.

For the treatment of purulent external otitis, Furaspor was dropped into the infected ear without any previous cleaning. The drug was kept in the ear for two to three minutes and at the same time a gentle massage to the ear canal was given. Then, the animal was allowed to shake out the ear contents without cleansing the ear canal. This was done once or twice daily for six to ten days, depending on the extent of the infection. Both dogs with purulent otitis were cured.

Seborrheic Dermatitis. Because of the apparently deep penetration of Furaspor into the treated skin, it was decided to use it in the topical treatment of localized seborrheic dermatitis in dogs. This condition has been observed particularly in some long-haired breeds, such as Cocker Spaniels and Springer Spaniels, in the form of round lesions scattered over the entire body and covered with greasy crusts and scales. Ten dogs with localized seborrheic dermatitis were treated orally with sodium thiosulfate (0.5 gm. t.i.d. for six days) and topically with Furaspor. The greasy crusts were first removed from the lesions and then Furaspor was rubbed into the lesions for one to three minutes until the skin started bleeding. This treatment was repeated daily for six to eight days. With the exception of one dog, all treated dogs were cured and, to date, they have not shown any recurrence of the seborrheic condition.

Demodectic Mange. Furaspor Liquid Veterinary was used in the topical treatment of demodectic mange in eight dogs, in which the mites are found in the skin, hair follicles and sebaceous glands. Five of these dogs in the beginning stage of the disease, showed dry, squamous, crusted lesions on the head and around the eyes. In each case, many demodectic mites were found in the deep skin scrapings. The preparation was rubbed into the dry skin lesions for two minutes, once a day for eight to 12 days. Three were cured completely by this treatment, their skin lesions cleared and scrapings from the lesions did not reveal any mites; to date, there has been no sign of recurrence. In two other dogs treated in the same way, the skin lesions improved, but the skin scrapings still show some mites. In the remaining case of dry, squamous, crusted condition the dog developed the pustular form around the eyes and eyelids. After six days of treatment with Furaspor Liquid Veterinary, this pustular condition cleared, and after 12 more days, the lesions improved essentially. Skin scrapings taken from the affected areas revealed a few mites; the dog is still being treated.

Sarcoptic Scabies. Three dogs infested with *Sarcoptes scabiei* on the head and extremities, were treated with Furaspor Liquid Veterinary topically, rubbed into the skin lesions once a day for eight days. Only one-half of the body surface was treated with this nitrofuran preparation on one day, and the other half was treated on the next day. After 12 more days of treatment, the skin lesions healed, itching stopped and the skin scrapings were free of mites.

Conclusion

Considering the results described in this paper, it appears that Furaspor Liquid Veterinary is an effective preparation for topical treatment of dermatomycoses, pyogenic dermatitis, seborrheic dermatitis and demodectic and sarcoptic acariasis in dogs, cats and horses.

RINGWORM INFECTION OF ZOO ANIMALS

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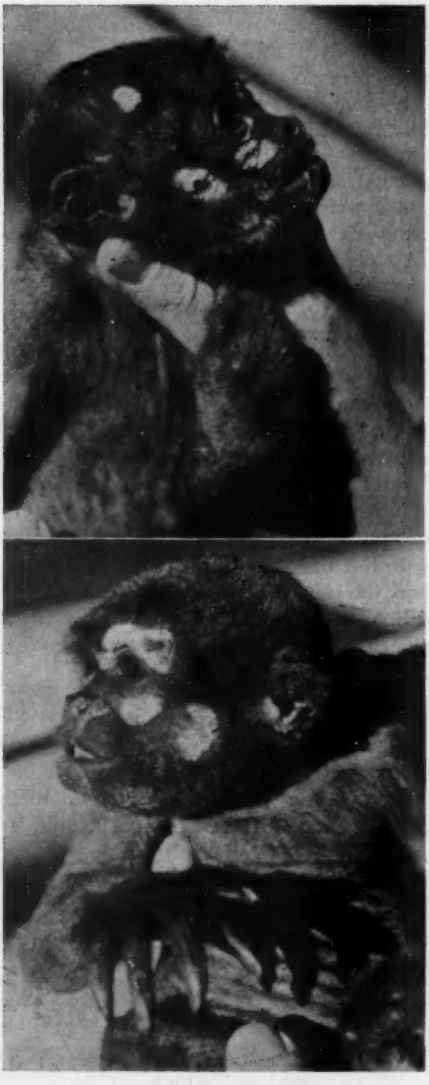

IN THE FALL OF 1959, we experienced an outbreak of ringworm in the children's zoo at Lincoln Park Zoo, Chicago, Illinois. Lesions suggesting ringworm were first noted on a capuchin monkey that was in quarantine for nearly a month after being donated to the zoo. A misunderstanding in orders resulted in the monkey being placed on display with two other monkeys before the quarantine period had expired.

The two other monkeys, a capuchin and a woolly, exhibited lesions soon after they were found on the first capuchin. Another spider monkey in a separate cage also exhibited skin lesions at approximately the same time.

The original capuchin monkey was sent to the University of Illinois Veterinary College for diagnosis and disposition on October 28, 1959. The lesions were so generalized that it was not deemed practical to treat this animal in the zoo. Diagnosis of Dermatomycosis was made at the veterinary school. Arthrospores of the ringworm fungus by direct microscopic examination of hair follicles were noted, and isolation was made of *Microsporum audouini*. This was from the capuchin monkey sent down and from the woolly monkey that had

---

A severe outbreak of ringworm started with a new capuchin monkey and a spider monkey. Microsporum audouini was isolated.

been in the same cage.

Before the outbreak was brought under control, the following animals showed some form of skin lesion:

Infection confirmed by direct microscopic examination and culture: capuchin monkey; woolly monkey.

Animals with suggestive ringworm lesions: capuchin monkey; spider monkey; pygmy donkey; chimpanzee; long-haired guinea pig; raccoon; guanaco.

Three of the four attendants in the building developed lesions typical of ringworm on the arms, neck, and face. Most of the baby animals in the building are handled daily by the attendants.

Treatment was as follows:

1. The building was closed until the situation could be evaluated.
2. All animals in the building were quarantined from the rest of the zoo.
3. Animals manifesting clinical signs of ringworm were isolated.
4. Fulvicin (Griseofulvin — Schering) was administered orally for 21 days on a basis of one tablet (250 mg.) per 20 lb. body weight.
5. All areas, where practical, were clipped of hair and Weladol Shampoo (Pitman-Moore) applied daily.
6. All animals that were in the building but not showing any clinical lesions were given oral Fulvicin for four days.
7. Every cage in the building was cleaned and sprayed with 4% formaldehyde solution at weekly intervals.

After a period of five weeks, every animal in the building was back to normal and no toxicity of any type was reported in any animals treated.

Institution of a strict control program and therapy with the new oral drug Fulvacin restored all animals to normal in a five week period.

Acknowledgments

This report would not be possible without the cooperation of Professor Harry Rhoades and his Mycology Department at the University of Illinois Veterinary College. Appreciation is also extended to Dr. Frank Kral of the University of Pennsylvania Veterinary College for his consultation in this case.

THERAPEUTIC PROPERTIES OF BITUMINOUS ASPHALTITE

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Problems in management of canine dermatoses are intensified because of the vicious cycle that develops:

1. Rubbing and scratching causes local inflammation.
2. This inflammation is spread through the hairs, which carry it to adjacent areas, the clotted hairs acting like a wick.
3. The inflammation is spread and aggravated through licking.

There is a drug preparation which can break this vicious cycle, namely, a varnish which can dissolve the active agent. It covers the inflamed skin; prevents spreading of the infection, and cannot be licked off.

Bitupal

Almost 2,000 years ago, the Greek physician, Dioscorides, praised the therapeutic effect of a bituminous asphaltite found in the Dead Sea. Virgil, the elder Pliny and Strabo also commented on the value of this substance for use in treating patients for various dermatologic conditions. Many bituminous substances are still used in medicine today, especially in dermatology, and every product has merits of its own. The coal, wood and shale tars, broadly classified as bituminous substances, have long been used in dermatologic therapy.

Bitumen-containing substances are, as as rule, found in four different varieties:

1. Asphalts (viscous, semi-solid or solid, mixed with mineral substances and water), containing 30-60% bitumen.
2. Asphaltic rocks (limestone or sand), containing 6-15% bitumen.
3. Bituminous slates which are difficult to extract.

The field of topical skin therapy has seen a maze of medicaments tried. Many newer drugs have a highly scientific rationale while most of the older products have been used largely on an empirical basis. This unique report from Israel represents a sincere effort to scientifically pinpoint the therapeutic properties of a very old medicinal substance.

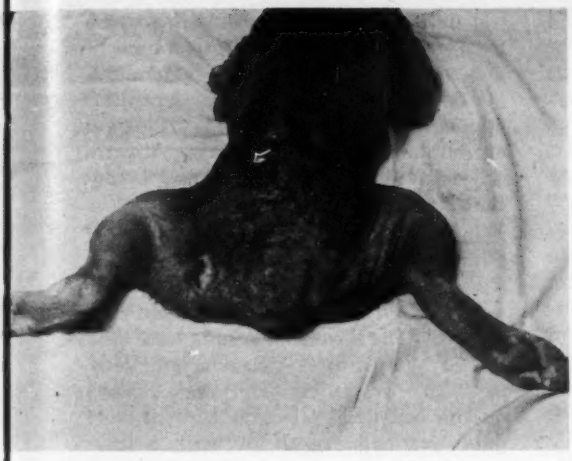

Fig. 1. Boxer bitch with dorsal seborrheic eczema. Note pyodermic patch on the left buttock before treatment.

Fig. 2. Same animal after treatment with Bitupal Varnish.

4. Hard asphaltites with a high melting point, called pitch blend. This is the mother substance of Bitupal which, since ancient times, has been found in the Dead Sea basin and its surroundings.

Deposits containing the bituminous material, asphaltite, are called "glance pitch." Glance pitch differs considerably in its composition from pyrogenous distillates, such as wood tars, coal tars, and shale tars, and has a soothing effect on sore skin. The purest form of this asphalt is obtained from the surface of the Dead Sea itself. Because of the high specific weight of the Dead Sea brine, which contains up to 23% minerals, asphaltite rises from the depth of the lake, normally by oozing out of the rocks and solidifying, but especially after earthquake shocks when it becomes detached from the asphalt veins. Large masses of block asphaltite then float on the surface and drift to the shore. They represent a natural product which is shipped to the manufacturer where it undergoes a cracking process under various temperatures and pressures. The product is redistilled, the viscous fraction is refined, and, finally free hydrogen sulfide is removed.

Solubility. The substance is insoluble in water and glycerol, and only partially soluble in alcohol. It is soluble in ether, chloroform, benzene, and fixed oils. Over

99% dissolves in carbon disulfide and yields 20% of fixed carbon.

Physical Properties. Viscosity at 24 C. is 0.61 to 0.68. Specific gravity is 0.967 to 0.968.

The ultraviolet absorption curve is characterized by a high peak near 2,300 A with an absorption coefficient K = 55 — 58, a flat shoulder at about 2,540 A with K = 34 — 36, and a tail extending into the visible part of the spectrum. This absorption curve suggests the presence of both dialkylnaphthalene and benzothiophene.

The infrared absorption curve yields the following information: the absence of OH and NH bands in the region 3,000 to 3,650 cm^{-1} shows the lack of appreciable amounts of phenols and amines. The C-H bands near 2,860 and 2,920 cm^{-1} are characteristic of aliphatic chains or hydroaromatic rings. The bands at about 1,377 cm^{-1} prove the presence of methyl groups in appreciable concentration. Long aliphatic chans are also observed (bands at 722 cm^{-1}).

In short, small amounts of carbazole, naphthalenes, benzothiophene, di-methylnaphthalene, and related substances are present, but carboxylic acids or esters are not detected.

Chemical Properties. The distillate is a reddish brown to brownish black liquid with a pleasant empyreumatic odor. It contains 77 to 80% carbon, 4.6% combined sulfur (estimated total sulfur by the oxygen bomb method, 6.2 to 6.6%), 9 to 9.6% hydrogen, 2.1% nitrogen, 0.1% oxygen, and 0.5% lime and iron oxide. No estrogenic hormone was found in the distillate. We consider this to be an additional advantage of the preparation.

Bitupal* is marketed in three forms: (a) 30% zinc oxide ointment; (b) 15% water washable cream; (c) 20% varnish (Bitupal — 20%, resins — 10%, alcohol and ether — 70%).

Materials and Methods

In the present report, our results with the third preparation — Bitupal Varnish 20% — will be noted. It fulfills the cardinal requirements of a skin preparation for dogs, i.e., it dries immediately after application, it has an anti-pruritic and anti-inflammatory effect, it does not leave any residue which may be licked off by the dog, it is not toxic.

In 1940, we reported on the use of Bitupal Varnish for canine skin diseases.[1] In 1942, there appeared a report on the use of Bitupal in human skin conditions.[2] The beneficial results were confirmed by Dostrovsky, Sagher and Verbi in 1959.[3] In the United States, reports on the beneficial effect of Bitupal were published as a result of work accomplished at the Cincinnati College of Medicine.[4,5]

Since 1940 we have had the opportunity of using Bitupal Varnish in the treatment of hundreds of dogs. Here we shall report only on 100 cases in which there was a possibility of a close follow-up. The causes of the different dermatoses were first determined, and, in line with the results of these tests complementary treatment was instituted; thus, *e.g.*, in cases of an allergic reaction to worms, piperazine preparations or mepacrine were given, in cases of furunculosis, penicillin and streptomycin were added. In all cases, the diseased skin area was separated from the adjacent hairy parts by clipping the hairs in order to prevent the further propagation of inflammation through clumps of hair sticking together. Bitupal Varnish was applied in the morning and evening, and, in extreme cases, also at midday. Immediately after the first application, itching disappeared, and dogs stopped licking diseased patches. Any constraint, such as bandaging, application of funnel-shaped collars, muzzling or leashing, became superfluous. In light cases, one day's application, and, on the average 3 days' application, was quite sufficient. In very severe cases with extreme discharge, we added to the Bitupal treatment a coating with antiseptic powders which adhered well to the Varnish and dried the skin within one day, but in most of the cases such drying treat-

*Bitupal is manufactured in Israel by TEVA, Middle East Pharmaceutical and Chemical Works Ltd., Jerusalem, and in the U.S.A. by AVEENO Corporation, New York.

ment was not considered necessary.

The diseases treated with Bitupal Varnish are summarized in table 1. Of the 100 cases reported, 85 were cured by the application of Bitupal alone, whereas in 15 cases additional therapy, such as worming or antibiotic treatment, was required. We consider these results particularly gratifying in view of the fact that many dogs were brought to us only after prolonged treatment by the dog owner or practitioner with the customary ointments, lotions and bandages. Under such treatment, dogs tended to develop large patches of exudating skin completely denuded of hair and epidermis.

Discussion

The diseases treated with Bitupal included allergic, infectious, eczematous or pruritic conditions. Cases of mange were not treated because Bitupal was not certain to kill the underlying cause of the disease, the mites. Extensive research on this question is being planned, since the high sulphur content of Bitupal suggests its effectiveness for cases of mange.

Summary

A new preparation for the treatment of various skin diseases in dogs is described. It is based on the use of distilled bituminous asphaltite — Bitupal Varnish — from the Dead Sea. Of the 100 cases described in this series, all reacted favorably to the preparation. The advantages of this product are quick drying action, (leaving no residue for the dog to lick off); soothing effect on the skin (so that dogs immediately stop scratching); the possibility of open treatment, completely doing away with bandaging, muzzling, collaring and leashing; and last, its speedy healing effect, curing even chronic cases within one to three days. Bituminous asphaltite can be considered an effective anti-pruritic, anti-allergic, anti-eczematous and anti-inflammatory agent with a wide margin of safety.

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TABLE 1. Therapeutic Results in 100 Dogs Treated with Distilled Bituminous Asphaltite (Bitupal) for Various Skin Diseases

Diseases	Number of dogs	Cured with Bitupal alone	Cured with Bitupal and additional drug therapy
Allergic pyodermia (dermatitis purulenta allergica)	45	40	5
Moist eczema (dermatitis madidans)	5	5	0
Seborrheic eczema (dermatitis seborrheica)	5	5	0
Eczematoid dermatitis (dermatitis infectiosa)	6	6	0
Self-inflicted ulcers (dermatitis factitia)	5	4	1
Itching (pruritus generalisatus, scroti, ani, vulvae)	5	3	2
Chafing (intertrigo)	6	6	0
Boils (furunculosis)	8	2	6
Panaritium (paronychia)	2	1	1
Distemper papules (impetigo febris catarrhalis canum)	3	3	0
Erythroderma (dermatitis exfoliata)	1	1	0
Drug eruption (dermatitis medicamentosa)	1	1	0
Nettle rash (urticaria)	5	5	0
Brandy face (acne)	1	1	0
Frost bite (dermatitis congelationis)	1	1	0
Thermal burns (dermatitis ambustionis)	1	1	0
Total	100	85	15

Here each month are published ideas, suggestions and comments picked up by VM reporters at veterinary meetings.

Small Animal Clinic

CANINE PANCREATITIS

Diseases of the canine pancreas can be broken into three classifications: acute pancreatitis, acinar atrophy and chronic pancreatitis.

Death occurs in 18 to 36 hours in acute pancreatitis due to severe shock. It is usually too late to do much, but any treatment attempted would be symptomatic. Leakage of enzymes causes fat necrosis in the pancreas with formation of soaps. A vicious circle is established when acute pancreatic necrosis occurs. Surrounding tissues and the peritoneal cavity are rapidly involved.

In man, this condition is associated with a fatty diet and high alcohol consumption. Sufficient duct blockage to cause enzyme leakage may be produced by minor inflammatory conditions.

Pancreatic acinar atrophy is peculiar to the dog and is typified by emaciation and a tendency to eat the stool. There is virtually no digestion and the stool is fatty. Lack of voluntary control is commonly reported. This condition is observed in three to four month old pups up to four years of age. Something apparently happens shortly after weaning.

Several clinical tests are available for this condition but the skinny dog, with a voracious appetite and fatty voluminous stools, is always strongly suggestive of pancreatic acinar atrophy. A quick determination can be run by placing a small quantity of the stool in a vial of water and shaking. On standing a fat layer rises to the surface. This test can be confirmed by making a smear of the stool on a slide and staining with Sudan IV stain. Huge fat droplets will be observed that take an orange stain. Another test is the gelatin digestion reaction. X-ray film emulsion is attached with gelatin. In cases of pancreatic acinar atrophy no trypsin is present and drops of stool will not digest the film emulsion. Stool from normal dogs will digest the emulsion. This test is not accurate but digestion of gelatin in test tubes is reasonably accurate. Various dilutions of the stool can be added to the tubes of gelatin and digestion time determined.

Another clinical test consists of feeding the patient a piece of striated muscle in a small gauze bag which is collected for examination after it is passed in the stool. If muscle striations are observed there is no trypsin activity.

There are two known causes of acinar atrophy. One may be produced experimentally with methionine deficiency. A deliberately produced methionine deficiency from weaning will cause absence of acinar tissue in the pancreas. This etiology has not been established as a clinical entity. Congenital deficiency of acinar tissue from birth is the other known cause.

Chronic pancreatitis is commonly observed as chronic relapsing pancreatitis. Patients are sick for a few days with severe soreness of the abdomen and vomiting. They clear up in a few days and go several months before having another attack. Eventually the pancreas becomes entirely fibrosed and there is no pancreatic activity. Insulin production is also impaired and these cases show concurrent diabetes mellitus.

Carcinoma of the pancreas may exist unnoticed until it seeds out enough metastasis to cause general debility. Metastasis occurs first in the liver. Hepatic damage is complete and the usual cause of death.

Summary

Death occurs rapidly in acute hemorrhagic pancreatitis. Acinar atrophy typified by voluminous fatty stools can be verified by clinical tests involving deficiency of enzyme secretion. Chronic pancreatitis is similar to acinar atrophy plus the complication of diabetes mellitus.—*Svend W. Nielsen, Indiana Meeting.*

Questions and Answers

From the Southern V.M.A. Convention
Baltimore, Maryland

Is electrical disturbance a problem in obtaining good electrocardiographs?

This is a very common problem with old machines. A 60 cycle alternating current disturbance is frequently picked up. This can generally be reduced by good grounding and moving equipment away from fluorescent light fixtures.

What percentage of cases examined by electrocardiograph yield a diagnosis and what lesions are commonly found?

We look more for conditions in dogs. About 30% of old dogs considered suspicious on physical examination yield positive electrocardiographic evidence.

Please explain the grading system of congenital hip dyplasia in the dog.

Dr. Gerry B. Schnelle explained that this was merely a method for description of observations. It has lead to some confusion as breeders have used minor variations as grounds to dispute the existence of the problem.

Would traction under anesthesia have any merit in management of intervertebral disk protrusion?

A practitioner in the audience reported that he had used this technic once or twice with rather dramatic results, but Doctor Schnelle commented that if traction could be enforced for long periods as in the human patient, it would probably be quite helpful, but traction under anesthesia might actually make the condition worse afterward.

How should intervertebral disk protrusion be treated?

Doctor Schnelle explained that there is a high percentage of spontaneous recovery. One should delay surgery as long as possible. Rest is extremely important. Do not even move them for *x*-ray purposes. Demerol controls pain nicely and aspirin works well. Cortisone therapy might be considered.

Is removal of the canine patella a practical procedure?

Dr. Jacques Jenny, University of Pennsylvania, commented that the procedure must be used with discretion. It is particularly indicated in adult dogs with a limited amount of bowing. In younger animals it is generally wise to try less drastic procedures. The leg will get quite crooked in these younger patients.

MEDICAL NOTES AND QUOTES

Effects of Exercise

Exercise decreases total serum cholesterol values in some subjects indirectly by reducing body weight. Henry J. Montoye, Ph.D., and associates of Michigan State University found that total serum cholesterol values were significantly lower in three human subjects with initially high concentrations who participated in regular, supervised exercise for three months than in two human subjects with high initial values who did not exercise.

Changes in total serum cholesterol accompanied changes in body weight in both the exercising and the nonexercising subjects. Values that were normal initially were not affected by exercise.—*Am. Jour. Clin. Nutrition, 7:139, 1959.*

Fracture of the Hyoid Bone

Hyoid bone fracture may be the result of direct trauma such as strangulation, car accidents, or gunshot wounds. Concomitant soft-tissue injuries of the neck frequently mask the fracture. Conversely, the possibility of fracture may be overlooked if the external soft-tissue injury is slight. Asphyxia with pharyngeal and laryngeal spasm may be fatal unless relieved promptly by tracheotomy.

Severe pain accentuated by swallowing, dysphagia, or severe dyspnea may occur. Tongue protrusion produces suffocation. Bone fragments may penetrate the soft tissue of the pharynx and cause profuse bleeding. Extensive subcutaneous emphysema may develop.

Roentgen criteria for diagnosis are a radiolucent line, interruption of the cortical continuity, or displacement of the fragments. The fracture line includes the greater cornu or junction of the body with a greater cornu. The fracture may be comminuted.

Many deaths due to hyoid bone fracture have doubtless been listed as caused by suffocation. The fracture is not found at necropsy or, if found, is not listed as the cause of death. Few patients are examined roentgenologically. Many patients probably compensate rapidly for such fractures by obtaining enough air and swallowing well enough to keep from strangling. If concussion and loss of reflexes are associated, death ensues unless the airway is opened promptly.

No particular treatment of the fracture is necessary even when comminuted. The tracheotomy tube may be removed after about three days.—*Radiology, 72:872, 1959.*

Escherichia coli in the Newborn

Neonatal transmission of organisms from asymptomatic mothers is responsible for the high incidence of diarrhea in newborn infants due to enteropathogenic *Escherichia coli* (EPEC).

A few days before and after delivery, rectal and vaginal swabs were obtained from 361 mothers; within four days of delivery, nasopharyngeal and rectal swabs were made from 355 of their infants. One of the 11 serotypes of EPEC was isolated from rectal swab cultures of 46 mothers (12.7%) and 23 of infants (6.5%). During the first four days of life, EPEC were isolated from 40% of infants of positive mothers, the same serotype being incriminated.

Of the positive mothers, 57% were detected when rectal swabs were obtained shortly before and after delivery; 74% when another swab was made the first day after delivery; 91% with a subsequent swab made the next day. Of the positive infants, 39, 74, and 96% were detected initially by cultures obtained one, two, and three days after delivery, respectively.

A supplementary study made at home during the first three months after delivery revealed a low incidence of diarrhea, with no EPEC, in infants of positive mothers (one of 23) and a high incidence among infants of negative mothers (28 of 40). Possibly, positive mothers may passively transmit antibodies that protect the infant. —*Am. Jour. Dis. Child, 97:255, 1959.*

L. pomona Vaccination Studies in Sheep

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THE INCIDENCE OF LEPTOSPIROSIS that is diagnosed both clinically and serologically in animals has been given considerable attention recently in several animal species, namely swine and cattle,[6,9,10] dogs,[12,2,9] and horses.[19,21] Few reports are contained in the literature concerning the incidence or the importance of this disease in sheep[20,17,3,16,14] and fewer in goats.[17,15,13] The public health significance of leptospirosis may result in more thorough surveys, even in those species presumably resistant to clinical disease, since a recent serological survey of Missouri veterinarians[12] indicates the occurrence of low level agglutination lysis (AL) titers in 5.2% of 155 serums tested.

Morse *et al.*[15] state "the course of *L. pomona* infection in goats appears occult . . . Transmission from infected swine to a

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goat has been established . . . In areas where the goat population is high, this species should be considered as a reservoir of *L. pomona* infection." Both Morse *et al.*[10] and Lindqvist *et al.*[14] state that sheep probably play a minor role in the transmission of *L. pomona* infection in the United States. However, van der Hoeden[13] suggests that in Israel, under favorable circumstances, host adaptation may occur which could result in a virulent strain of leptospirosis affecting sheep, although in his studies *L. gryppotyphosa* was avirulent (clinically) for two sheep but highly pathogenic for goats.

The degree of morbidity of ovine leptospirosis apparently varies between this country and New Zealand. In view of the pathogenicity of *L. pomona* in New Zealand sheep as reported by Hartley[11] and Webster and Reynolds,[20] continued attention must be given to the possibility of a virulent strain of *L. pomona* becoming established in the sheep population in the United States. Beamer *et al.*[1] observed abortions and deaths in Illinois sheep attributable to Leptospira infection. Although specific species were not isolated, leptospira-like organisms were found in the stomach contents of an aborted fetus. In view of these findings, it can be assumed that leptospirosis as a disease in sheep may become important and that vaccination in this species would be indicated.

This report is presented to demonstrate the positive serologic response in sheep following vaccination with *L. pomona* bacterin (Antilepto—Merck).

Materials and Methods

Twenty-five eight to ten month old ewe lambs were selected for experimental study. The entire group was bled and the AL titers against *L. pomona* were determined. Immediately after the first bleeding, 20 animals were randomly selected and received 5 cc. of bacterin subcutaneously in the axillary region. Thirteen days following the injection, the vaccinated animals were bled and the AL titers were determined.

Table 1 shows the serological response of sheep following vaccination with *L. pomona* bacterin. Table 2 shows the serological response in ten animals (five from vaccinated group of table 1 and five controls) following challenge. Challenge was accomplished by the subcutaneous injection of 2 cc. of defibrinated blood from Leptospira-infected guinea pigs (*L. pomona*, strain MLS) into each of the ten animals on the 82nd day post vaccination.

TABLE 1. Serological Response of Sheep Vaccinated With Leptospira Bacterin

	Agglutination-Lysis Titer				
	Pre Vaccination	Post Vaccination			
Sheep No.	0 Days*	13 Days	33 Days	54 Days	82 Days
1	0	250	250	NT	NT
2	0	1250	50	250	50
3	10	50	50	10	NT
4	10	250	50	50	50
5	0	10	0	0	NT
6	10	250	250	250	50
7	0	50	50	50	NT
8	10	1250	250	50	10
9	10	50	250	50	NT
10	10	1250	250	250	NT
11	10	250	250	50	10
12	10	250	250	50	NT
13	10	1250	6250	50	NT
14	0	250	250	250	NT
15	0	250	50	50	NT
16	10	1250	250	250	NT
17	0	1250	250	50	NT
18	0	250	250	250	NT
19	0	1250	250	250	NT
20	0	250	250	50	NT
		CONTROLS			
21	0		0		0
22	0		0		0
23	0		0		0
24	0		0		0
25	0		0		10

*Animals vaccinated immediately following bleeding.
NT—Not tested.

Table 1 shows the serological response of 20 vaccinated animals. Examination of the values recorded between the 33rd and 82nd day indicates that the AL titer during this post vaccination period is substantially reduced. Table 2 presents AL titer data on five vaccinates and five controls post challenge. The titer elevation in the vaccinates was negligible, whereas AL titers in the five nonvaccinates were elevated. The control challenge group exhibited a peak temperature rise between four and six days, confirming observations made earlier by Webster.[20] However, in contrast to the reports of this writer, little or no rise in tem-

perature occurred in the vaccinated challenge group.

As has been demonstrated in hogs and cattle, the serologic response to introduction of organisms is not nearly as great following vaccination as that following infection in nonvaccinated animals. The same phenomenon has been noted in vaccinated sheep, since they show but a slight rise in AL titer following challenge. This observation, together with a lack of clinical signs of disease in vaccinated sheep after challenge, is believed to be evidence of immunity established by vaccination with *L. pomona* bacterin.

Animal no. 24 in the control (nonvaccinated) challenge group died on the 20th day of the experiment. Kidney tissue was cultured in anaerobic meat infusion broth and brain bouillon, plated on blood agar plates, grown aerobically and anaerobically and examined. Further cultures were also made in Stuart's medium and incubated at 30 C. for two days and examined by darkfield illumination. No leptospirae were found in these cultures.

The broth cultures, plates and liquid cultures showed no Leptospira. However, an alpha Streptococcus, a gram-negative bacillus resembling the Escherichia group and a gram-positive baccillus resembling the Bacillus group were found. No indication of *Clostridium perfringens* was observed.

Discussion

L. pomona has been shown to be pathogenic for sheep by Webster[20] and Hartley[11] in New Zealand, yet workers in the United States[17,16,14] have demonstrated a relatively low degree of pathogenicity in sheep for the strains of *L. pomona* used in their experimental work. Undoubtedly strain variation plays an important part in the degree of pathogenicity of an infectious agent. The possibility of adaptation to sheep by a more virulent strain of *L. pomona* must be considered. The brief study herein described was conducted to demonstrate serologically the efficacy of a commercial *L. pomona* bacterin in producing AL titers in sheep. Subsequent challenge of five nonvaccinated controls and five vaccinated animals with a virulent strain of *L. pomona* demonstrated what we believe to be an effective immunologic response to an *L. pomona* bacterin.

The temperature rise and inappetence seen in the nonvaccinated challenge animals were in accord with observations made by Webster *et al.*[20] and occurred between the fourth and sixth days. Correlated with the temperature rise is the uniform increase in AL titer observed in the nonvaccinated sheep following challenge, whereas the vaccinated animals showed no temperature elevation and had a minimal rise in titer post challenge. This is in accord with vaccination studies reported on in swine[6,7] and cattle[5,4] and sheep.[20]

TABLE 2. Serological Response of Vaccinated and Control Sheep Following Challenge With Virulent Leptospira Agglutination-Lysis Titers

Sheep No.*	Pre Challenge 82 Days**	Post Challenge 7 Days†	14 Days†	21 Days†	28 Days†
	Vaccinated Group				
2	50	250	250	0	0
4	50	50	50	10	10
6	50	50	50	0	0
8	10	50	50	10	10
11	10	50	0	0	0
	Control Group				
21	0	1250	6250	1250	1250
22	0	1250	6250	1250	1250
23	0	1250	31250	31250	31250
24	0	250	50	Died	
25	0	250	6250	1250	1250

*Same animals listed in table 1.
**Challenged 82 days post vaccination.
†Days following challenge.

Diarrhea was observed in two of each group of five challenged animals (bacterin vaccinates and controls) and was believed due to a change of feed, change of environment and moving the animals (necessitated, unfortunately, at the start of the experiment) and was not considered a part of the symptomatology.

The single animal (no. 24) in the control group that died was negative for leptospiral organisms as evidenced by the results from several culture procedures. No explanation relative to the experiment can be given for the death of this animal, yet it is interesting to note that in it the AL titer following challenge was significantly lower than that seen in the other challenged control animals and appeared to be in the same order of agglutination response as that seen post challenge in the vaccinated group. Other workers[10,14] have demonstrated that leptospirosis in most sheep persists for short periods, 44 days or less, and that maximum duration noted for the renal carrier state is 62 days.

In spite of the negative culture findings, it appears more likely that the death of animal no. 24 was due directly or indirectly to the effects of the challenge exposure rather than to chance.

Summary

1. *L. pomona* bacterin appears to be an effective immunizing agent in sheep as demonstrated by serologic response before and after experimental challenge.

2. The *L. pomona* (strain MLS) challenge in this study caused mild clinical symptoms in challenged control animals but not the vaccinated sheep.

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(continued from page 42)

results in a solid immunity against subsequent infections of that type, but the pig remains completely susceptible to the other form. There is no cross-immunity.

Predisposing Causes. The disease occurs primarily in the fall, winter, and early spring and is transmitted by the swine louse, Haematopinus. Perhaps other insects also serve as vectors.

Age Incidence. This condition usually affects animals four to six weeks of age, but occasionally occurs in older animals. It may be found on the dam's udder when baby pigs are affected.

Signs of Infection. There are two forms of the disease. One form is mild, almost subclinical, in which lesions are confined to the ventral, hairless areas of the body. The second form is termed acute, bloody, or septicemic. In this form the lesions become generalized extending to the mouth and nose and over the entire body surface.

In both forms of pox, lesions begin as papules, small red swollen areas on the hairless ventral surface. This is followed by a pustular stage, which ruptures, and exudes lymph. The lymph dries forming a thick scab. The scab falls off, leaving a crater-like lesion. The typical course is run in two or three weeks.

In the acute form there is a rise in temperature, 106 F to 108 F. Anorexia occurs. Eyes become gummy due to irritation from the lesions adjacent to the eyes. The hair coat becomes rough and dry. They may cough due to piling up in the bedding or because of bronchial pox lesions. Otitis media develops due to ear lesions. Ears become swollen and occasionally pigs are noted circling. They move slowly and stiffly. Secondary infections may produce death.

In the mild form of the disease, lesions are located ventrally, but may extend to the back and sides. Few visible signs of sickness are noted. The mortality rate in both types is negiligible, unless secondarily complicated.

Occasionally, some pox lesions extend into the upper respiratory tract, but necropsy findings are not significant, unless secondarily complicated.

Diagnosis. Diagnosis is based on the finding of the typical skin lesions, and the differentiation of this disease from exudative epidermitis, photosensitization, and other skin lesions.

Treatment. Burning the litter and disinfecting the premises are necessary. Isolate all clean swine and disinfect the house and feeding equipment. Dip or spray with 0.25% Chlordane or the product of choice to rid pigs of lice. Beneficial effect has been reported from a 1:17 lime sulfur dip. Do not vaccinate hogs against cholera with this disease in the herd. Delouse hogs prior to vaccination (seven to ten days prior). Serious losses have occurred from the use of serum and virus in hogs in the incubative stage of this disease. If 75% to 80% are in the eruptive stage of the disease, vaccination may be feasible.

Vesicular Exanthema

Cause. A filterable virus is the cause of vesicular exanthema.

Age Incidence. Swine of any age may be infected.

Signs of Infection. In baby pigs there may be respiratory distress due to involvement of nostrils with vesicles. Temperature rises to 108 F. until vesicles rupture, then it drops. The vesicles appear on the anterior surface of the snout and on the feet and coronary band and between the digits and on the pads and at the dew claws. Vesicles range in size from two to three mm. to a size large enough to cover the entire top of the snout or complete foot pad. Vesicles occur on the teats and udders of milking sows and usually are accompanied by a cessation of lactation. Varying degrees of lameness occur due to foot involvement. In the initial stages, there is a loss of appetite. Pigs squeal with pain when they are forced to move. Sows may abort during the febrile stage of the disease. The mortality rate is high in young suckling pigs.

For necropsy findings, treatment and prevention, a fuller discussion of this disease should be sought. It is mentioned here only to call attention to its occurrence in baby pigs. This disease is now

considered eradicated in the U. S. If symptoms of this disease are noted, proper State or Federal authorities should be contacted.

Vesicular stomatitis, clinically indistinguishable from vesicular exanthema also occurs in baby pigs and animal inoculation and other tests are necessary to differentiate the two.

Other Diseases Involving the Skin

Most mineral and vitamin deficiencies cause rough, scaly skin. Anemic pigs develop a rough coat and wrinkled skin. Any prolonged disease may cause a rough, staring coat. A streptococcic dermatitis often develops in baby pigs following fighting. The fighting may be due to insufficient milk and competition among the pigs for teats, and a bacteremia may develop causing death. A rough, scaly, cracked skin develops in baby pigs grazing on rye grass, rape, some species of clover, buckwheat, oats and other plants containing photodynamic agents. This is particularly true when they graze early in the day while the dew is still present. Skin lesions may be manifest in erysipelas, hog cholera, edema disease and of course by external parasites. Ringworm and Pityriasis Rosea must also be considered when skin lesions are found in baby pigs. An excellent description of these latter diseases is given by Sippel in "Diseases of Swine".

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Symposium on Encephalomyelitis

Eastern viral encephalomyelitis, the disease which was responsible for the deaths of 32 human beings and 13 horses in New Jersey last fall, was the subject of a special symposium at the University of Pennsylvania School of Veterinary Medicine recently.

Dr. Richard E. Shope, a member of the Rockefeller Institute, was Symposium chairman.

Guest speakers, and their subjects were Dr. Roscoe P. Kandle, State Commissioner of Health, Trenton, who will discuss all aspects of the recent outbreak of EVE in New Jersey; Dr. R. S. Chamberlain, entomologist, U. S. Public Health Service Communicable Disease Center, Montgomery, Alabama, who discussed the important parts played by the bird and mosquito in transmission of the disease to horses and man; Dr. Jordi Casals, staff member, the Rockefeller Foundation, whose topic was methods of diagnosing the disease; Dr. Martin Kaplan, chief, Veterinary Public Health, World Health Organization, who discussed implications of international transmission of arbor viruses, with specific reference to the encephalomyelitis viruses; and Dr. Robert R. Marshak, professor of medicine, University of Pennsylvania School of Veterinary Medicine, who spoke on clinical signs, symptoms and methods of diagnosis and prevention of the disease in the horse.

Uterine Prolapse In the Ewe

Every lambing season one is confronted with the almost inevitable series of cases of vaginal and uterine prolapse in the immediate *pre-partum* and *post-partum* ewe.

To eliminate prolapse or partial prolapse after suturing and tearing of the vulval lips, it was decided that some form of cushioning between the cervix and the vulva was essential. This seemed best effected by a strong balloon or bladder. This was inserted into the vagina and then firmly inflated with a bicycle pump; the vulva was then sutured. It was initially successful in about half of the cases. It was quickly realized that careful placing and inflation of the bladder was most important and when properly carried out no sutures were usually necessary.

Once the cleaned and slightly lubricated cervix and vagina are reduced, the bladder is introduced, the mouth facing backwards with the pump connection already fixed. Once the bicycle pump is connected the bladder is partly inflated, the hand meanwhile being kept on the cervix to hold it *in situ*. After partial inflation (it is surprising how difficult it is to withdraw one's hand) the hand is gently pulled away and the bladder quickly inflated. The point of vital importance, however, is to place the inflating bladder anterior to the pelvic inlet. Once tied off the inflated bladder lies between the cervix and the pelvic bones and any further straining by the animal is against her own pelvic bones. If the bladder leaks or is insufficiently inflated the animal straining will force the bladder through the pelvic inlet and all may be lost.

I dispense with sutures and usually remove the bladder 24 to 72 hours after insertion or in very bad cases leave it in place until lambing commences. It has been my experience that when the bladder is removed after 24 to 72 hours, few cases prolapse a second time.—*O. Y. Mayor, The Veterinary Record, October 18, 1958.*

Courtesy of Dr. Perry Jensen, George, Iowa.

LISTERIOSIS IN A HERD OF CATTLE

H. C. SMITH, D.V.M.
ELMER SUNDQUIST, D.V.M.

A DISEASE OF CATTLE due to the *Listeria monocytogenes* organism has been described in veterinary literature for the past 30 years. The condition usually involves the central nervous system. Occasionally it is associated with sudden deaths in a herd. It is a specific infectious and often fatal disease of animals and man. These facts may make clinical diagnosis difficult.

Sporadic outbreaks reported in different parts of the United States suggest the widespread distribution of listeriosis. Data gathered during recent years suggest that the disease is on the increase. Although it is not a major concern at this time, it might well be in years to come.

Our experience indicates that, in cattle, the disease does not spread rapidly through the herd. Very few of the cattle that reveal marked signs recover. Usually not more than 5 to 15% of a herd become affected, and only a few of those affected exhibit evidence of a central nervous system disturbance. Some animals, however, become prostrate in a few hours.

The period of incubation for *Listeria monocytogenes* is unknown.

The clinical course is variable. In some herds a few deaths may occur suddenly,

with no additional losses following. In other herds, the disease may run for several months with only an occasional animal becoming affected.

Some investigators have suggested respiratory rather than oral exposure to be responsible in cases of Listeria induced encephalitis of ruminants. The methods by which this organism is transmitted are unknown.

Listeriosis is not always a disease of the central nervous system. H. Stenberg[1] isolated the organisms from the vaginal mucus of a cow, suggesting that future work might prove some abortions of cattle to be due to this organism.

In one case reviewed by the writers, sheep had been raised on a farm for a number of years. An occasional sheep had died, no diagnosis being made. At the time of our investigation, this fact did not seem to be important. Later, when we began to review the literature, we found that such a history suggests the possibility of listeriosis.

Signs in Cattle

The animals are usually afebrile, although temperatures of 103 to 104 F are common in the early stages.

The duration of illness depends on the parts of the brain affected. It may last only a few days, or as long as two weeks. Sudden deaths may be evident.

Walking in circles is a common manifestation before the animal goes down. Once down, they usually prefer to lie on a side. Kicking of legs is common. Twisting of the head with one dropped ear is evident in some cases. Other signs include opacity of the cornea, blindness, impaired vision, gritting of the teeth, dullness, drooling at the mouth, facial paralysis, increased cerebral spinal fluid, prostration, coma and death. An occasional animal may show aggressiveness as in rabies or pseudorabies.

Differential Diagnosis

Listeriosis may be confused with any disease or condition which exhibits central nervous system involvement. These may include rabies, pseudorabies, sporadic bovine encephalomyelitis, leptospirosis, anaplasmosis and infections of the sinuses of the head following dehorning. The non-infectious conditions that require differential diagnosis are forage poisoning, chemical poisoning, autointoxication and head injuries.

Case Report

The case reported here involved 29 head of long yearling Hereford steers weighing about 900 to 1,000 pounds each. They had been purchased by the owner at a central market and had been on the farm for about six weeks. These cattle were on an excellent ration of corn, oats, concentrate and alfalfa hay. A complete mineral mixture was available for free choice feeding. The water was obtained from a deep well. The animals were confined to a feedlot adjacent to a large barn and shed. There were native cattle on the farm. No additional cattle had been added to the original 29.

The first observation of a noticeable illness was made by the owner. One steer began to run or walk sideways. It was observed to be down on its side for an entire week before it died. The owner called his veterinarian and asked for a necropsy report. No pathological condition was apparent and therefore no specimens were submitted to a laboratory.

A second animal sickened. It was down for three days. A week later two steers were found down and help was requested. The animals were removed to a local rendering works where complete autopsies were performed.

Postmortem examinations yielded no conclusive evidence. Specimens of vital organs were removed and taken to the laboratory. Heads were removed from the bodies and the brains were taken out at the laboratory and immediately frozen. The meninges appeared to be inflamed.

All of the vital organs were cultured on both aerobic and anaerobic media and incubated at 37 F. temperature for 48 hours. At this time all cultures were negative.

Courtesy of Dr. Perry Jensen, George, Iowa.

Fig. 2. Listeriosis may be confused with any disease of the central nervous system, leptospirosis, anaplasmosis or dehorning infections.

The brains were cultured according to the method described by Gray *et al.*[11] After three days of incubation, a growth of an organism similar to *L. monocytogenes* was obtained. The organism was a small Gram-positive rod. This organism fermented and produced acid in glucose, lactose, maltose and sucrose.

Cultures inoculated subdurally produced deaths in rabbits in 28 to 36 hours. The organism was again recovered. A drop of culture in the eye of a rabbit produced a conjunctivitis in 12 hours.

Treatment

Once the animal is down, treatment may not always be successful, although spontaneous recoveries sometimes occur. Therapy of choice has been the use of 5 gm. of Terramycin in 500 cc. of 50% glucose injected intravenously.

Review of Literature

1. Peter Olafson[3] reported that the first case of listeriosis in cattle occurred in New York State in 1932. Thirteen outbreaks have occurred since that time. He suggested that rodents might be carriers of the disease.

2. Two years later Jones and Little[5] observed listeriosis in cattle in New Jersey.

3. Graham *et al.*[4] encountered listeriosis as a cause of abortion in cattle. An extensive report[6] of four herds of cattle affected with listeriosis in Illinois stands prominent in the literature. In these cases, the organism was sometimes recovered from the central nervous system, but more frequently from the medulla. Other reports include the following.

4. Pomeroy *et al.*[8] reported a case of listeriosis involving a 450 pound Holstein calf in Minnesota. The organism was isolated from the brain stem.

5. Schwarte and Biester[7] reported the first case of bovine listeriosis in Iowa in 1938.

6. W. L. Lee[9] of Wisconsin reported that out of 160 head of Hereford heifers, 40 became affected. All of them died or were destroyed. The diagnosis was confirmed by the isolation of the organisms.

7. C. R. Cole[9] reported the first case in Ohio in 1946.

8. Pounden *et al.*[10] described an outbreak involving a herd of 27 four-month-old calves still nursing their mothers in which eight died of listeriosis. In this herd, the older animals were not affected. The disease appeared on a farm that had

Courtesy of Dr. Perry Jensen, George, Iowa.

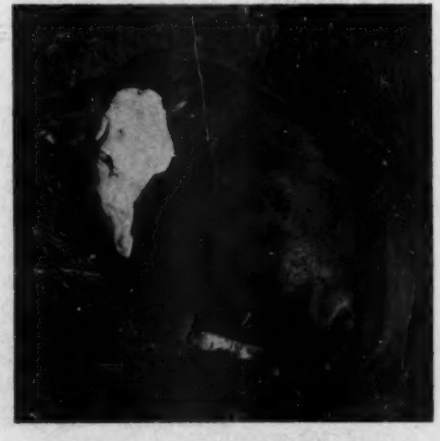

Fig. 3. Cow with Listeriosis. Non-infectious conditions that require differential diagnosis are forage and chemical poisoning, auto-intoxication and head injuries.

previously been occupied by sheep that had died of the disease.

9. Gray *et al.*[11] described in detail a direct isolation of the microorganism from the bovine brain. The method itself has met with only partial success. The writers in this case suggested freezing the brain and then making inoculations on tryptose agar slants. For the technic described, a heavy inoculum is helpful. Growth usually appears in from three to ten days of incubation. The writers have suggested that the bovine brain may contain some bacteriostatic factor for *Listeria monocytogenes* that may be destroyed by freezing.

10. Jensen & Mackey,[12] in an excellent article on the pathology as seen in listeriosis, also reported on their observation made on 39 farms during the feeding seasons of 1946 to 1948 in Colorado. In most instances, the disease appeared in successive years.

11. D. E. Ward[13] reported eight cases in California, all of which recovered spontaneously. The diagnosis was made clinically. He suggested the use of sodium iodide as treatment.

12. Boyer *et al.*[14] reported on the disease condition in Georgia in 1949. Listeriosis had not been reported from Georgia until 1951.

13. John T. McGrath[15] reported that from 1952 to 1954 he had observed ten cases of listeriosis in cattle in Pennsylvania.

14. Gray *et al.*[16] exposed a pregnant cow for two weeks by giving the animal cultures of the organism in drinking water. The cow was seven months pregnant and delivered a normal calf 45 days after cultures were removed.

15. Finally, Eveleth *et al.*[17] reported that therapeutic treatment for listeriosis has not been effective because, by the time symptoms are observed, the disease has progressed to the point that irreparable damage has been done to the tissues involved. During 1957 and 1958, Eveleth and his associates vaccinated 20,000 sheep with a bacterin prepared from the organisms. They concluded that the use of a bacterin has been found to be of value as a prophylactic for the prevention of listeriosis in sheep. An excellent bibliography is presented.

Summary

Sudden illness in feeder cattle may prove to be listeriosis. Differential diagnosis may be clinically difficult. The history of previous deaths of sheep on the same farm may be of some value. Available evidence has prompted the writers to suggest that this disease is on the increase and that further work is needed to establish the mode of infection. Isolation of *Listeria monocytogenes* is required in confirming a diagnosis.

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Books reviewed in this department and any other books, if available, may be obtained by remitting published price to publisher.

Practitioner's Bookshelf

THE PRINCIPLES OF HUMANE EXPERIMENTAL TECHNIQUE, by W. M. S. Russell, D. Phil., and R. L. Burch; 248 pages. Animal Welfare Institute, 22 East 17th Street, New York 3, New York. Price—$4.20.

The humane treatment of animals used for experiment has been a matter of concern to biologists and others since Charles Darwin. Much has recently been written on the humane care of these animals before and after experiments. The time seemed ripe for a systematic application of similar principles to the technic of experimentation itself. That is what this book is about. It is the outcome of several years of work sponsored by the Universities Federation for Animal Welfare.

The book includes a full descriptive account of animal experimentation in the United Kingdom, with copious numerical facts, many of them here published for the first time, about the experimental uses to which various species of animals are put in different types of laboratory. There is a full discussion of the three main modes of making experiment both more humane and more efficient: replacement of animals as objects of experiment by insentient material such as tissue cultures; reduction in the numbers of animals used to obtain results of given precision, chiefly by controlling individual variation in their physiological responses; refinement of procedures employed when animals still have to be used.

Among the relevant subjects treated are the principles governing the use of models in science, the design and analysis of experiments, the genetical and environmental aspects of variety in animals, the physiology of pain and distress, the relations between behavioral states and animal physiology, the choice of species for particular purposes, and some of the special problems raised in the growing field of experimental psychiatry. The book ends with a brief discussion of the sociological factors governing the progress of humane and efficient experimental technique.

CLINICAL VETERINARY SURGERY, Vol. I, by *R. H. Smythe, M.R.C.V.S.*; 262 pages, illustrated. Charles C. Thomas, 301-327 East Lawrence Avenue, Springfield, Illinois, Publisher, 1959. Price—

Written to fill the need for such a work on clinical surgery, this volume abandons traditional lines, yet is concerned with basic principles of surgery, the etiology of various conditions and their diagnosis. It suggests how knowledge can be applied in the promotion of healing and practice of the veterinary art.

The publishers suggest that the problem of space has made it necessary to omit discussion of specific surgical technics and procedures generally, and that these are to be covered in a second volume.

The writer is widely known for his recent book, *Veterinary Ophthalmology*.

Tularemia

Human cases of tularemia reach their peak during the hunting season. Tularemia is primarily an infectious disease of rabbits, rodents and birds. It is transmitted from animal to animal by ticks, fleas, and lice. Man is secondarily infected by contact with infected rabbits. Contact with ticks during the spring and summer is another mode of transmission to man and human cases are sometimes contracted by eating partially cooked flesh of infected rabbits and by the bite or scratch of a dog or cat after eating infected rabbits.

A few simple precautions, such as wearing rubber gloves while dressing rabbits, avoiding sick or "lazy" rabbits which are easily caught by dogs, and eating only well cooked rabbits which have no yellowish-white spots on their liver or other internal organs, will greatly reduce the incidence of tularemia in man.—*Veterinary Public Health Newsletter, December 1959.*

Cystic Ovaries

Cystic ovaries in high-producing dairy cattle present the practitioner with a serious problem. Research indicates that cyst formations are probably most frequently due to disturbed hormonal influence. Thus estrum may be regular in approximately three out of four cases, whereas one out of four may exhibit no evidence of heat (silent heat). Even those revealing heat may not conceive after repeated service.

With usual method of treatment, small cysts are rectally massaged. Larger ones are ruptured by digital pressure applied rectally. It is also considered routine practice to drain the cyst through a vaginally inserted needle with the ovary guided to the needle by the rectal route. An average of 3,500 units of luteinizing agent in the form of chorionic gonadotropin should be used to prevent anaphylactic reaction. When repeat infection is evident, a few cc. additional dosage are indicated.

Foreign reports indicate better results in cases of larger cysts with partial drainage—not rupture—with the luteinizing agent injected directly into the cyst cavity. In cases responding favorably, follicular growth and corpus luteum formation are re-established. It has even been indicated that the discontinuance of the lactation process is helpful to establish the regular cycle so that a calf will be obtained. Intrafollicular application of the hormone is especially worthy of a trial when two or three intravenous injections have been fruitless.—*R. R. Dykstra, D.V.M.*

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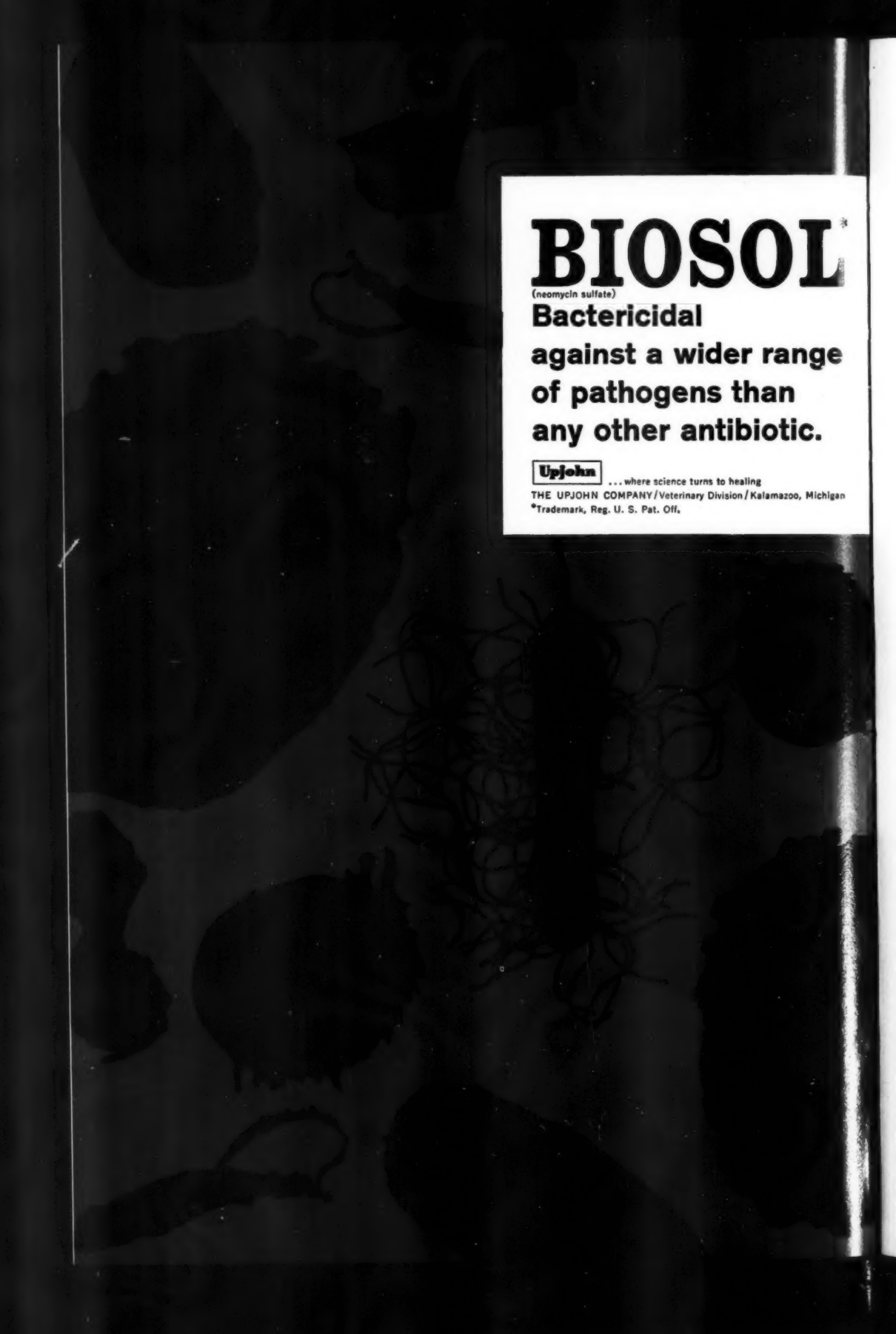
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Editorial Comment

VETERINARY EDUCATION

In conversations with deans of various veterinary schools, an almost universal concern over decreasing numbers of top notch students leaves a lasting impression. This phenomenon is hard for most of us to accept, since it was only a few brief years ago that our schools were swamped with more outstanding candidates than they could hope to handle.

A check with medical schools indicates a similar trend. Apparently the sputnik scare and the increased emphasis on physics and engineering is making its mark on our young people. We must also recognize that the 40 hour week of big industry and assured high levels of income offered today make the service arts less inviting.

The future of veterinary medicine as a profession lies in the hands of its members. Recognized veterinarians in a community exert profound influence on thinking young men. We should not hesitate to encourage promising young men to pursue our chosen profession at this time. Among the respected professions the practice of dealing with illness in living creatures is the oldest. The pendulum will shortly swing again to favor the medical sciences. In fact, the keen young man selecting veterinary medicine now while enthralled crowds run the other direction will be in an excellent position when the pendulum of popularity returns.

One of the great advantages of a career in veterinary medicine is that intellectual stagnation is almost impossible, and certainly reserved for the irresponsible or the lazy. For anyone with intellectual curiosity and professional responsibility, veterinary medicine demands a lifetime of learning.

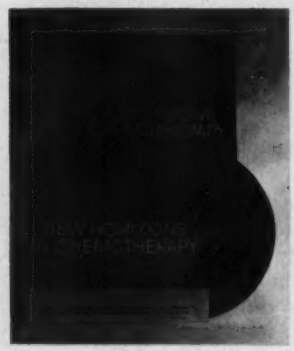
Of the several mechanisms by which a practicing veterinarian can keep abreast of the main stream of progress, probably none can substitute for regular reading of the periodical literature. The editors of VETERINARY MEDICINE are fully cognizant of their responsibility to make sure that every important advance is presented promptly and understandably. We feel that the practicing veterinarian will enjoy his work and do a better job if he imposes the responsibility on himself to arrange his work program in a way that permits study throughout a lifetime, not merely during his initial preparation for practice.

C. M. Cooper, D.V.M.

This department will announce each issue new therapeutic items, equipment, services, and literature of interest to veterinarians. All claims made are those of the firms concerned. Send communications to the address noted.

Reader's Service

A new **Educational Record Album** highlights nitrofuran veterinary symposium. A novel technique of communicating important medical information in veterinary medicine to students, educators and practitioners, is



incorporated in a two-part record album produced by the veterinary medical division of Eaton Laboratories. The album, entitled "New Horizons in Chemotherapy," contains highlights of speeches presented at the 2nd Regional Conference on the Nitrofurans in Veterinary Medicine. It is being distributed by Eaton to all veterinary medical schools and state associations in the United States. These speeches were tape-recorded at the time of the conference and edited versions form the basis of the two records in the album. The records are 33⅓ rpm LPs. Total listening time runs about one and a half hours. Copies of the album are available for loan to professional veterinary groups upon request from the Eaton Veterinary Medical Division.

A new **Disposable Transparent Celufilm Bag** for laboratory specimens made of a combination of polyethylene and cellophane bonded together is offered by Klean Kan Bag Company. Polyethylene acts as a moisture barrier while cellophane is a gas barrier, therefore the Celufilm polycello combination acts as a moisture vapor barrier and confines gases and odors. Samples are available with twist tie closures from Klean Kan Bag Company, 64 East Eighth Street, New York City.

A new **Sterilizer** which features completely automatic push-button control and substantially reduced cycle time has been announced by Wilmot Castle Company, Rochester, New York. Called the Castle Orthomatic, the new unit eliminates human monitoring or error. The unit can take all loads and cycle temperature can be varied from 220 F. to 270 F. simply by turning a calibrated dial. For more details ask Wilmot Castle, 1939 East Henrietta Road, Rochester, New York.

A new, compact and highly efficient **Electrostatic Deodorizer** has been developed by Morris Deodorizers of Knoxville, Tennessee. The cabinet type unit has been designed to burn out odors electrostatically within a room area. It is ideal for use in the veterinary hospital. For details, ask Morris Deodorizers, Inc., 2819 Broadway, N.E., Knoxville 17, Tennessee.

A Quarter Milker saves time milking cows that have mastitis-infected or injured quarters. It permits machine milking the isolated quarter along with the others, keeps milk from the affected quarter away from other milk, and ends hand milking, thus aiding rapid healing. Its use also ends the danger of condemned milk from contamination by antibiotics. Priced at $4.95, this unit is available from Quarter Milker Company, 809 S. E. Powell Blvd., Portland 2, Oregon.

Maxipen designates an improved, synthetically-modified penicillin which appears to have marked advantages over any form of penicillin now available. The drug is still undergoing extensive evaluation and is not generally available. Maxipen produces blood levels several times higher than the highest now available with the original penicillins or their modification.

Beckton Dickinson has a small device that's not advertised but is excellent for opening up syringes. It is made of needle hubs fastened together. One end is fastened to a syringe full of water, the other end to the sticking syringe. Water pressure will open most sticking plungers.

Karo Syrup is an excellent fluid for fecal flotations. No fuss or bother is involved in preparation. A little detergent or antiseptic will control mold in the bottle.

Boating Enthusiasts who own a boat in a waterfront community, but have no dock, should check Small Boat Launching Ramps, Docks and Piers. This helpful guide gives construction hints, sketches and specifications for building these attractions for boating enthusiasts. Ask Outboard Boating Club of America, 307 North Michigan Avenue, Chicago 1, Illinois.

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Tears and Emotional Stress

In an article by Montaque in the December 4, 1959 issue of *Science*, attention is called to the fact that in mammals man is the only one that sheds tears when under emotional stress, although children less than six weeks of age generally shed no tears when crying. Tears over the outside of the facial regions are of no great importance, but inside the nasal passages, in conjunction with secretions from cells lining these passages, the lacrimal secretion, because it contains the protein or enzyme lysozyme, is decidedly bactericidal. When the nasal mucosa is moist, lysozyme will quickly inactivate poliomyelitis virus as well as several other viruses. Outside the nasal passages the action of lysozyme is of much less bacteriocidal intensity. Also the autosterilizing function of tears is greatly reduced when the nasal mucosa is dry. This can be produced, if desirable, by insufflation with a jet of air. In animal disease research, drying nasal mucosa preliminary to the experimental introduction of viruses for disease reproduction is a step practiced in most laboratories.—*R. R. Dykstra, D.V.M.*

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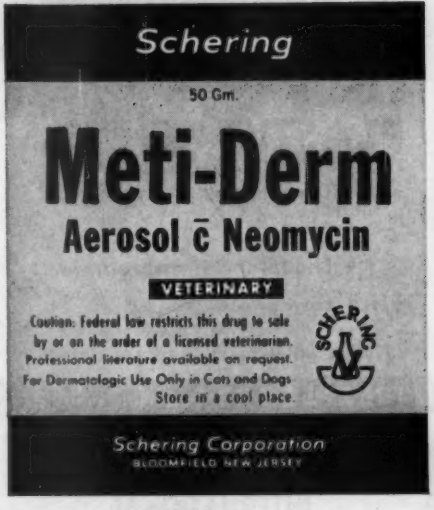
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A.A.H.A. to Meet in Boston

The American Animal Hospital Association will hold its annual convention in the Statler-Hilton Hotel, Boston, Mass., on April 19th to 22nd.

Four seminars are scheduled for the first day. The theme for these will be Diagnosis, covering the Heart & Lungs, the Liver, Stomach and Intestines, and the Urogenital System. During the past three years these seminars have proven to be very popular. One entire day will be devoted to "The Management of the Injured Animal," covering every possible aspect of care and treatment. One half-day will cover Feline Problems under the able direction of Miss Jean Holzworth.

Two of England's foremost Small Animal clinicians will contribute to the program, bringing new ideas and giving the meeting an international flavor.

All veterinarians and their wives are cordially invited to attend the convention and join in all functions.

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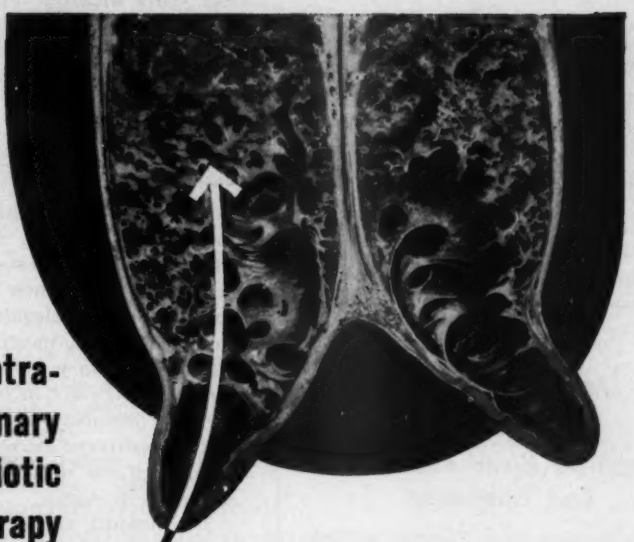
Dr. Stanwood W. Haigler, 7645 Delmar, St. Louis, was named the "Veterinarian of the Year" at the annual convention banquet of the Missouri Veterinary Medical Association in Kansas City in February.

Dr. Haigler has been a practicing veterinarian since 1918. He has been a member of the Missouri Veterinary Medical Assn. since 1927, serves as chairman of Membership and Inspection committee of the American Animal Hospital Assn., was a founder of the Greater St. Louis Veterinary Medical Assn., and is active in many civic organizations there. Dr. Haigler has also served as a member of the Missouri State Veterinary Examining Board for the past twelve years. The award was made in the form of a plaque by Dr. W. H. Mowder, past president.



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Liquamast is completely soluble in milk, thereby providing maximum antibiotic concentrations therein.

Liquamast diffuses readily, via the milk, to the sites of infection in the upper portions of the mammary gland, whereas oil or ointment type vehicles have a tendency to settle in the main duct of the udder. In extremely deep-seated, chronic cases, Liquamast is a good adjunct to systemic oxytetracycline therapy.

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Phillips to Fromm Laboratories

Fromm Laboratories, Inc., Grafton, Wis., has announced the appointment of Mr. S. W. (Stan) Phillips, as Regional Supervisor of their East Central Division.

In that Fromm Laboratories' products are distributed only through independent veterinary distributors, Mr. Phillips will cooperate with these distributors in making the veterinary profession better acquainted with the quality of Fromm biologicals.

Mr. Phillips has had long experience in the veterinary field. He has spent about five years with one pharmaceutical manufacturer and about eight years with a large veterinary pharmaceutical, biological and instrument manufacturer.

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With the changes in the Constitution of the Auxiliary to the American Veterinary Medical Association state Constitutions will need revision. The new Constitution changes the number of delegates a state may send to the National meeting. Now *each constituent auxiliary may select one delegate for each fifty (50), or fraction thereof, members of this auxiliary, as of January 1st. Each constituent auxiliary shall be entitled to at least one delegate, but no more than seven (7) delegates.*

In Missouri, since the constitution states the Vice-President shall be the delegate, the executive board has made the recommendation that she be the chairman of the delegation. This permits the chairman to meet with the other delegates from her auxiliary, and they can discuss problems and projects to be voted upon. In the past, many delegates attended the meetings with no experience or understanding of the National organization. In fact delegates have attended conventions with little knowledge of their state organization.

Each state auxiliary has different objectives and projects, so their delegates should have all the information possible before they go to the convention.

There is another important service the delegates can, and should, give to their auxiliaries, and that is to report to their home auxiliary.

Erratum

The January 1960 issue of VETERINARY MEDICINE published a report on Hemobartonellosis in the Dog by Doctors Donovan and Loeb (pages 57 through 62). On Tables 1 through 6, pgs. 59-62, the headings N-S Neut (non-segmented neutrophils) and S Neut (segmented neutrophils) were transposed and should read N-S Neut and S Neut in that order.

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Veterinary Calendar

Mar. 30-31. **New Jersey Veterinary Medical Association.** Seventy-sixth annual meeting. Hotel Claridge, Atlantic City. John R. McCoy, 236 Highway 18, East Brunswick, New Jersey, secretary.

Apr. 3-5. **Alabama Veterinary Medical Association,** annual meeting. Battle House, Mobile, Alabama. Dr. M. K. Heath, secretary.

Apr. 4-6. **Washington State University,** annual Conference for Veterinarians, Department of Veterinary Clinical Medicine, Pullman, Washington. Hugh C. Butler, conference chairman.

Apr. 19-22. **American Animal Hospital Association,** annual convention. Statler-Hilton Hotel, Boston, Massachusetts. Dr. Frank Booth, 3920 E. Jackson Blvd., Elkhart, Indiana, executive secretary.

Apr. 30-May 1. **Third Annual Florida Conference for Veterinarians,** symposium on Diseases of Young Animals. University of Florida, Gainesville, Florida. W. R. Pritchard, head, Department of Veterinary Science, University of Florida, Gainesville, correspondent.

May 3-4. **University of Pennsylvania,** annual Conference of Veterinarians, School of Veterinary Medicine, Philadelphia, Pennsylvania. W. H. Rhodes, D.V.M., program chairman.

May 19-21. **Kansas State University,** 22nd annual Conference for Kansas Veterinarians. School of Veterinary Medicine, Kansas State University, Manhattan, Kansas. M. W. Osburn, D.V.M., extension veterinarian.

Jun. 2-3. **Texas Conference of Veterinarians,** 13th annual meeting. School of Veterinary Medicine, College Station, Texas. Dr. R. D. Turk, conference chairman.

Jun. 20. **West Virginia Veterinary Board,** examinations for state license. Capitol Bldg., Room E-116 Ground Floor, East Wing, Charleston, West Virginia. Dr. Henry J. Fallon, secretary-treasurer, 200 Fifth Street West, Huntington, West Virginia.

Jun. 20-21. **North Carolina Veterinary Medical Association.** Fifty-ninth annual summer meeting. Grove Park Inn, Ashville, North Carolina. J. T. Dixon, 3026 South Main Street, Winston-Salem, North Carolina, secretary-treasurer.

Jun. 20-21. **Michigan State Board of Veterinary Examiners,** examination for state license at Lansing, Michigan. Corresponding Secretary, 641 Lewis Cass Bldg., Lansing 13, Michigan.

Jun. 20-22. **North Carolina State Veterinary Examining Board,** examinations for a license in North Carolina. Grove Park Inn, Asheville, North Carolina. Dr. James I. Cornwell, P. O. Box 9038, Asheville, secretary-treasurer.

Jun. 23-24. **Maryland State Veterinary Medical Association,** summer meeting. George Washington Hotel, Ocean City, Maryland. Dr. Harry L. Schultz, Jr., secretary.

Dr. Earl to Head Animal Health Division at CIBA Pharmaceutical

Due to the expansion of the agricultural and veterinary research program at CIBA Pharmaceutical Products, Inc., the veterinary research section of the research department has been renamed the animal health division.

Dr. Alfred E. Earl, formerly head of veterinary research, will assume directorship of the new division. He also becomes a member of the research board, which plans and directs CIBA research activities.

The new division will seek to develop new products in the agricultural and veterinary fields. It also will conduct toxicity tests for other divisions of the research department, as well as for the preparation of new drug applications.

Dr. Earl joined CIBA as an associate pharmacologist in 1948. He was named senior research veterinarian three years later, and director of Veterinary Research in 1954. Before joining CIBA, he was in private veterinary practice.

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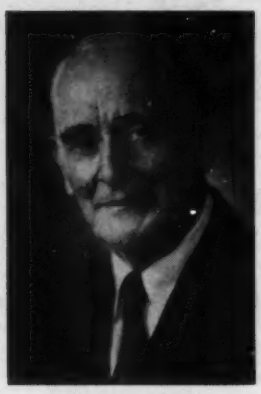

Dr. Francis W. Schofield

The following is an excerpt from the February issue of VM, written by Dr. A. H. Quin, with quotations from a letter by Dr. Schofield.

"I have just returned from a visit to the orphanage of Mrs. Euh Pueen. It is amazing how this tiny woman with so frail a body manages an orphanage of 60 boys. Small quantities of rice come from the government; friends help with clothes and money; but for most of her supplies she depends on prayer to God and supplication to man. Her heroic and saintly spirit shines through the care-worn and deeply furrowed face. Eighty-one years old and weighing only about 80 lb., this frail little woman, with the help of a stick, moves slowly from place to place among her big family. On Sunday they all go to church together where she has been teaching Sunday School for more than 50 years.

"There is a serious defect in the orphanage, as no land is attached to the buildings. There is overcrowding with no place for the children to either work or play. We must buy land and, fortunately, this can be done. There must be a vegetable garden in which older boys can work and a bit of land on which younger ones may play. We are also going to make a few rabbit hutches and pens for chickens.

"The piece of land, about one-quarter acre, will cost $500., and I have been able to make a deposit of $100. on it."

Contributions and messages of encouragement are still being received. The following brief message from Korea is directed to the many friends and colleagues interested in Dr. Schofield's work:

"So many times since coming to Korea I have had to say the Americans are the most friendly and most generous people in the world. Now it is difficult for an Englishman to talk like that, but it is absolutely true, and I have visited in many countries.

I am most thankful to you for the check for $245." (Donations from VM readers are forwarded along with letters. Dr. Schofield apparently has not received all the letters as numerous contributions came from our Canadian colleagues. Donations are still being received and forwarded promptly to Dr. Schofield.) "It is indeed encouraging to know that so many of 'the boys' are sympathetic to what I am trying to do, e.g. build up the Department of Pathology at the Seoul National College of Veterinary Medicine, spread the Christian Faith among the students by means of English conversation classes using the New Testament as our text, plus helping support two orphanges. I can assure you that it is a full time job. Faith in God and an unswerving conviction of the need and necessity of what is being done are the two facts of supreme importance.

Within a few days I will mail pictures of the orphanages and the saintly and courageous Mother Euh Pueen."